Appendices —

Appendix 1: Port-Orford-Cedar Management Guidelines

The "Port-Orford-Cedar Management Guidelines" (1994) are included here because they are part of current management direction for the Roseburg, Medford, and Coos Bay Bureau of Land Management (BLM) Districts referenced in the description of Alternative 1 in Chapter 2. The document was retyped in its entirety during the preparation of this draft supplemental environmental impact statement (SEIS), and any differences between this version and the original are editorial only. Note that the Table of Contents page numbers have been changed to reflect formatting for insertion into this document.

PORT-ORFORD-CEDAR MANAGEMENT GUIDELINES

U.S. Department of the Interior
Bureau of Land Management

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PORT-ORFORD-CEDAR MANAGEMENT GUIDELINES

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I. INTRODUCTION

POC (*Chamaecyparis lawsoniana* [A. Murr.] Pari) (abbreviated hereafter as POC) is a minor but valuable component of the forests of southwester Oregon and northwestern California. It is usually found as scattered individuals in a stand but can also occur in continuous stands. Population distribution inland is usually associated with drainages, particularly in the southern portion of its range (Atzet, 1993). The species occurs primarily at low-to-mid elevations but has been found up to approximately 7,000 feet in northern California (Greenup, 1992a). The greatest concentration of POC is in Oregon in the northern third of its range, on the coastal hills and terraces from Coos Bay to Port Orford and in the adjacent southern edge of the Coast Range, including the drainages on the middle and south forks of the Coquille River (Zobel, 1985). Secondary concentrations occur in land at moderate-to-high elevations near the Oregon/California border and in the watersheds of Grayback Creek and Deer Creek in southeastern Josephine County, Oregon (Atzet, 1979; Hawk, 1977). Throughout its range, the species is under attack by the fatal fungal pathogen *Phytophthora lateralis* (*P. lat.*), which causes POC root disease (Kliejunas, 1981). Forest management activities such as road construction, timber harvest, site preparation, and fuels treatment can increase the risk of spreading the disease by introducing the pathogen to uninfested areas.

POC spans the floristic transition one between the vegetation of California and the Pacific Northwest (Harrow and Harrar, 1969). POC occurs in five plant series in the Klamath Province: white fir (A*bies concolor* Gord. & Glend.), western hemlock (*Tsuga heterophylla* [Raf.] Sarg.), POC, tanoak (*Lithocarpus densiforus* [Hook and Arn.], Rehd.), and Jeffrey pine (*Pinus jeffreyi* Grev. And Balf.) (Atzet and Wheeler, 1984). Tree associates range from Sitka spruce (*Piceal sitchensis* [Bong.] Carr.) in the northern part of the POC range to incense-cedar (*Calocedrus decurrens* [Torr.] Florin) at the lower latitudes. Other common tee species associated with POC include Douglas-fir (*Psuedotsuga menziesi monticola* Dougl.), sugar pine (*Pinus lambertinana* Dougl.), and red alter (*Alnus rubra* Bong.) (Harlow and Harrar, 1969). In addition, the range of POC overlaps an area of high plant diversity containing many other endemic species.

POC is limited to areas with relatively high ratios of precipitation to evaporation (Zobel et al., 1985). POC is opportunistic, and it can establish itself in quantity during early seral stages, after disturbance in stands and under an intact forest canopy. The species is shade tolerant and also grows well in the open. Zobel (1990) found that POC reached breast height in 5 to 11 years in clearcuts; and under a forest canopy, it took 14 to 31 years. Good seed crops can occur as often as every 4 or 5 years but generally not for 2 years in a row (Zobel, 1979).

II. *PHYTOPHTHORA LATERALIS* AND PORT-ORFORD-CEDAR

The first external evidence of the root disease is a slight discoloration of the foliage which, within a few weeks to months, depending on the weather conditions and tree size, gradually takes on a yellow wilted appearance. The color changes from yellow to bright red, then to red-brown, and finally brown. Trees usually lose all foliage 2 to 3 years after death. POC root disease is best identified by the cinnamon-colored inner bark and cambium that abruptly joins the creamy white, healthy inner bark in roots and lower boles. Just prior to tree death, the discolored zone may extend 2 to 5 feet above ground (Hadfield et al., 1986).

An infection of *P. lat.*, possible and introduced pathogen, was first reported in an ornamental POC near Seattle, Washington, in 1923. It was fond in southwestern Oregon in 1952 (Roth et al., 1987). There is no proven resistance to *P. lat.* with POC although occasional POC remain alive after surrounding POC have been killed (Hansen et al., 1989). Whether this survival is due to some degree of resistance or lack of exposure of the pathogen remains unclear.

P. lat. is a root-inhabiting fungus transmitted via soil and/or water. The pathogen enters through root grafts or directly through the tips of fine roots (Gordon and Roth, 1976). Damage from this moisture- and low-temperature-dependent fungus peaks during the cool, wet season; but crown symptoms lag behind due to abundant atmospheric moisture. As moisture stress builds in late spring and summer, the damaged root system is unable to meet the evapotranspiration requirements of the tree. This

results in the simultaneous death of the crown (Zobel et al., 1985). While seedlings and small POC quickly succumb to the pathogen, large POC may take a year or more to die.

The resting spores (chlamydospores) develop in rootlets and are released into soil as the roots deteriorate. The dormant chlamydospores form fruiting bodies (sporangial) in saturated soil, which in turn release motile zoospores. Zoospores required flowing water to travel any distance. The fungus survives as chlamydospores in soil without a host for up to 4 years in northwestern California (Kliejunas, 1992). Spore survival, without a host, in the Coos County forest and at Oregon State University has reached 6 years and 7 years, respectively. At both sites, chlamydospore population levels are on a downward trajectory (Hansen, 1994).

Chlamydospore survival rates decline during periods of summer drought, which is a normal occurrence in portions of the range of POC. A significant decrease in spore survival occurred when isolated organic matter, and organic matter in soil containing *P. lat.* spores, was stored in sealed plastic bags and heated to 68 degrees Fahrenheit for a period of 18 weeks. At this same temperature, survival of *P. lat.* inorganic matter was favored in moist soil, but not in saturated soil. Naturally infested organic matter in clay soil stored in sealed plastic bags did not show a decreased survival in moist soil (0.3 bars tension), but did show decreased survival in saturated soil (0 bars tension). In slightly dried soils (approximately 25 bars tension), *P. lat.* survived at only very low levels after 16 weeks at 68 degrees Fahrenheit (Ostrofsky et al., 1977).

Spore transport occurs via a variety of mechanisms. Logging equipment, vehicles, humans, and animals (particularly elk) can transport infested soil (Zobel et al., 1985). It can be transmitted by surface water in streams or ditches. Disease transmission can also occur via root grafts and, in some rare instances, through rain splashed spores (Gordon, 1974). Trees in close proximity to the stream channel downstream from infected areas have the best chance of contracting the disease. Upslope spread is more difficult, occurring through root grafts and possibly by disease movement from infected to uninfected POC roots that are in close proximity to each other (Gordon, 1974).

If soil infested with chlamydospores is transported to uninfested areas, new infections can occur. This requires a precise sequence of events: chlamydospores must reach POC root tips; germination must occur; and the root tips must be penetrated to initiate infection. *P. lat.*, while fatal to POC, may not be the sole cause of death in a given tree. Microsite conditions such as moisture stress, mechanical damage, or insects can contribute to mortality.

Once a tree becomes infected, mortality is frequently rapid. However, when infestation occurs in an area, it is rare for all of the POC to become infected. Surveys done in areas where the pathogen has been present for 30 years have shown that not all POC were killed (Schoeppach, 1991). Whether this phenomenon is due to resistance, isolation, unknown factors, or a combination of these, is not clear.

III. *PHYTOPHTHORA LATERALIS* AND PACIFIC YEW

Recently, it has been documented that Pacific yew (*Taxus brevifolia* Nutt.) is also susceptible to *P. lat.* (DeNitto and Kliejunas, 1991; Greenup, 1992). Pacific yew contains taxol, a compound which has shown promise as an ovarian cancer treatment. The Pacific yew mortality only occurred in areas where there are also infected POC. No mortality due to *P. lat.* has been documented on BLM lands.

Pacific yew infected with *P. lat.* show the same symptoms as those seen on infected POC. Crown discoloration and cambium stain occur. It appears that the resistance to *P. lat.* within Pacific yew is more variable than that seen in POC (Greenup, 1992a).

IV. MANAGEMENT OBJECTIVES FOR PORT-ORFORD-CEDAR

POC requires special protection because it is an important component of some forest ecosystems, it is economically valuable, and it is vulnerable to an introduced pathogen that is spread primarily through human activities.

A. Proactive management – limit the spread of *P. lat.* and reduce the number of infested areas.

B. Retain POC as a species, identify resistant individuals, and incorporate them into a tree improvement program.

C. Incorporate *P. lat.* control strategies as management objectives in Riparian Reserves (RRs), Late-Successional Reserves (LSRs), and Matrix.

D. Provide POC as a primary forest product.

E. Promote public involvement in POC management.

F. Develop a budget and implementation schedule for the Port-Orford-Cedar Management Program.

V. IMPLEMENTATION STRATEGY TO ACHIEVE POC MANAGEMENT OBJECTIVES

A. Proactive management – limit the spread of *P. lat.* and reduce the number of infected areas.

The intent is to stop the spread of *P. lat.* into POC and Pacific yew populations, and to design and implement management strategies that decrease the number of disease locations in a manner consistent with objectives identified in district resource management plans. At present, no documentation exists that indicates a successful eradication of *P. lat.*, on a specific site has been accomplished. A management strategy for an area may include POC eradication and preventing POC regeneration until the inoculum present on the site dies out. The ultimate goal is to reestablish POC into those areas where the pathogen had previously existed.

An accurate inventory of POC and *P. lat.* is essential for the development of a management strategy. Populations of POC should initially be mapped geographically by plant series and associations. Areas where POC is found should then be subdivided according to seed zones and elevation bands. Areas where timber harvest has occurred that still contain POC populations must be examined for the occurrence of *P. lat.* Areas with POC present, and where no harvest activities have occurred, should receive the same analysis.

The inventory of POC and *P. lat.* areas will be ongoing as the POC management strategy is implemented. At a minimum the inventory should include the following:

1. Determine which POC areas also have populations of Pacific yew.

2. Track all occurrence of POC populations and *P. lat.* infestations in MICRO*STORMS (M*S) and Geographic Information Systems (GIS).

3. Analyze the relationships between infested and uninfested areas (i.e., what is the probability of the uninfested stand becoming infested?) Further analysis should examine if *P. lat.* infested sites are expanding, stable, or decreasing, the relationship of *P. lat.* population trends to land management activities, and the specific reasons for the impacts to *P. lat.* populations.

4. Monitor for occurrence of *P. lat.* and the effectiveness of management of the pathogen and disease control. Monitoring projects will need to continue for at least 5 years in the drier portions of the range of POC and for longer periods where climatic conditions are wetter.

This information should be consolidated in an annual report.

All entries into POC areas should be coordinated with the district POC program lead and the resource area silviculture group(s). The forest development program should incorporate POC objectives in reforestation, timber stand improvement, and the development of silvicultural prescriptions. Strategies to meet road construction, renovation, maintenance, and road management objectives need to include POC goals. Existing timber sales that do not address POC should be modified to include consideration for POC management. Entries are not just those for timber sales or silvicultural activities. They include, but are not limited to, such things as firewood cutting, hunting, and any other actions within POC areas.

There are at least three key risk indicators regarding the introduction of *P. lat.* to uninfested sites. The first is the potential for infested soil to be transported upstream of uninfested POC areas due to an increase in exposure points such as steam crossing or roadwork (new construction, renovation, maintenance, or decommissioning). Recreational activities such as horseback riding, off-road vehicle traffic, or even mountain bike riding could also increase the chances of *P. lat.* infection. The second factor Is the duration of the increased risk; that is, the number of trips by logging trucks, logging machinery, etc. The more trips, the greater the potential for infection. The third risk indicator is the season in which activities occur in POC areas. Activities that occur during the wet season have a greater potential to move infested soil to areas that presently do not contain *P. lat*. A risk analysis procedure has been developed by the USFS and is presented as Appendix 4 is this paper. This appraisal should be conducted for all areas containing POC.

POC, *P. lat.*, and Pacific yew mapping will be the key to success of the Interregional POC Coordinating Group, of which BLM is an active participant. This group was established in 1987 to ensure a coordinated, interregional, interagency effort to manage the root disease. The group structure has recently been reorganized into two areas: a policy oversight team and a technical team. The policy oversight team will include a representative from: (1) Forest Pest Management in USFS Region 5, (2) Forest Insects and Diseases Group in Region 6, (3) the Forest Supervisors, and (4) the Oregon/Washington State Office and Medford District Office of the BLM.

B. Retain POC as a species, identify resistant individuals, and incorporate them into a tree improvement program.

The goal is to join with the USFS in its research program to identify genetic resistance to *P. lat*. Resistance is defined as slowing the rate of a pathogen's advance in diseased tissue, rather than immunity. No trees have been identified that have the potential to stand up indefinitely in areas of extreme inoculum exposure. However, though a breeding program, the possibility of producing stock with a high level of resistance certainly may exist (Martinson, 1994). As with Douglas-fir, POC has a wide tolerance for variations in environment (probably related to genetic variability) that allows it to compete successfully in a wide range of environmental conditions (Millar et al., 1991). This great ecological amplitude of POC is believed to reflect a geographic concentration of genetically-based characteristics that had developed in a much larger geographic range (Edwards, 1983).

In the past, ornamental varieties of POC have been grafted to root stocks of *P. lat.*-resistant members of the family Cupressaceae with varied success (Torgeson et al., 1954). Research continues regarding POC and *P. lat*. Currently, the Pacific Southwest Research Station is conducting a rangewide genetics study on POC. Under contract with the USFS, researchers at Oregon State University are evaluating the survival of potentially resistant parent trees, collecting seed and vegetative material from parent trees for propagation, and screening seedlings and rooted cuttings for resistance (Greenup, 1992b). With the exception of the Coos Bay District, BLM has not been actively involved with these programs in the past. However, there are opportunities to support upcoming studies on POC. Specific actions include, but are not limited to, identification of resistant POC, cone collections from

suspected resistant individual trees, and outplanting of seedlings grown from collected seed to test resistance. These research opportunities should be anticipated and aggressively pursued. Management objectives and practices will need to be reviewed and updated as additional research is published.

Current searches for resistance are in highly-infested areas where selection pressure has been present for some time. Single trees that have survived in areas of sever mortality may be resistant. Harvesting or precommercial thinning of POC in infected areas should be preceded by evaluation of the POC population for resistance. All trees should not be tested, as this is biologically unnecessary as well as financially impractical. Even the most ambitions sampling schemes cannot test all trees within a given population. The probability of removing a tree with some level of resistance is extremely low in areas that have not seen extensive mortality (Greenup, 1992a).

The current screening process for POC with resistance has been underway for over 10 years. The screening criteria was developed by Dr. Lewis Roth and Dr. Everett Hansen of Oregon State University, Don Goheen of the Southwest Oregon Forest Insect and Disease Technical Center et al. Screening includes POC stem inoculation with *P. lat.*, soil inoculation with *P. lat.* and transplanting POC into the infested soil, and immersing the root of seedlings and rooted cuttings in a water suspension of *P. lat.* zoospores (Hansen et al., 1989). Over 200 selected trees are currently being evaluated for resistance. Discussions with USFS geneticists and pathologists indicate an extremely low potential for loss of resistance by harvesting or other removal of POC (Greenup, 1992a). Timber sales involving green POC should be evaluated for resistance candidates prior to harvesting.

Guidelines for selecting trees in the wild for resistance:

1. Select trees that appear to have been exposed to the fungus. Selected trees should retain green crowns and be in close proximity to those exhibiting symptoms of *P. lat*.

2. Select trees in previously infested areas that stay wet for long periods of time.

3. Selected trees that are not elevated on rises above existing infected trees. Roots should be wet or have been subjected to the same water flow as infected trees.

4. The candidate tree should have root disease killed trees above and below it on the same slope.

5. Trees should have normal-looking green foliage and should have been exposed at the time the existing dead trees were exposed.

6. POC roots graft with roots of other POC. In wet areas, the pathogen will involve the entire area.

7. Trees occurring on the edges of visibly infested sites can be selected for resistance testing if they meet the probably exposure criteria (Greenup, 1992a).

Some POC populations occur on lands set aside for uses other than timber production. It will be necessary to ascertain which seed zones and elevation bands containing uninfected POC colonies are not represented in the set aside areas. Additional uninfected POC populations may need to be reserved for maintenance of POC gene pool diversity. Populations that are reserved should be selected by plant series and associations. POC genetic diversity appears to increase with decreasing elevation and soil diversity (Millar and

Marshall, 1991). In general, BLM lands are lower in elevation than those administered by the USFS. Therefore, POC populations on BLM lands may have a greater genetic diversity that that currently known to exist.

C. Incorporate *P. lat.* control strategies as management objectives in RRs, LSRs, and in the Matrix.

There are some specific situations involving POC management that deserve distinct consideration: management actions in infested RRs, LSRs, within the Matrix, or other special management areas that contain *P. lat.* or uninfected POC. These areas will require application of site-specific procedures. With careful consideration, an integrated strategy can be developed where more than one resource value can be enhanced. Any action(s) taken must be consistent with the management objectives identified in the district RMO for these areas.

1. Riparian Reserves

Riparian areas may contain diseased POC. In some areas, it may be possible to remove POC while at the same time maintaining riparian quality. To realize the full benefits for the riparian management area, consult with the wildlife biologist, fisheries biologists, hydrologists, and other resource specialists to identify the specific objectives for that riparian area, and how POC management can assist in attaining these goals. POC management within RRs must conform to the Aquatic Conservation Strategy (USDA and USDI, 1994).

Live trees showing signs of infection, but needed to increase the dead wood component in riparian areas, could be girdled and left to fall or felled intentionally if additional down woody material is required immediately. The presence of snags and logs in most environments make them particularly valuable to amphibians (Oliver, 1992). One contribution from POC management that could provide immediate and future benefits is the status of the coarse woody material component of the riparian area. Determine whether the riparian area's present and predicted future requirements for large woody material are being and will continue to be met. If additional material is required, specialists can use geometric and empirical equations based on tree size and distance from the stream to identify POC that can provide large woody material recruitment (Robinson and Beschta, 1990). Because of their resistance to decay, POC snags and logs are long-lived components of riparian habitat (Jimerson and Creasy, 1991).

Riparian area containing dead or diseased POC must be surveyed to determine whether an adequate amount of snags and down logs exist. Girdled trees would create snags and future sources of coarse woody debris. If existing levels of down wood are less than desired, POC could be felled; either to provide down logs outside the stream or to crate an in-channel structure. POC logs also provide organic input as well as structure to streams where anadromous fish spawn.

Preliminary work has been done in determining these figures. USFS data for both the POC and Tanoak series give some indications of the snag component for these forest communities where little human disturbance has occurred (Atzet and McCrimmon, 1992). Unfortunately, data for down coarse woody material has yet to be developed; but the case can be made that is the natural snag component is maintained over time, coarse woody debris requirements will also be maintained. Snags and other woody debris need not, and should not, be recruited solely from POC; but dead POC does present an opportunity to provide a habitat component that may be lacking.

Since the disease can move via root grafts, monitoring would be required to determine if root contact between uninfested POC and the infection center has been broken. There is little information available regarding the development of POC root systems. The only detailed description of POC root systems is for a 50-year-old dense stand in coastal Coos County. In this stand, 0.6 percent of the major roots extended beyond 6.7 meters from the bole of the tree (Gordon, 1974; Gordon and Roth, 1976). Based on this work, treating an area infected with *P. lat.* could include green POC adjacent to the infection site and currently showing no sign of *P. lat*. This could involve the removal of the live host (green trees that show no sign of infection) adjacent to the infection site. Again, removal could involve girdling, cutting and leaving the tree, or even harvesting the green POC. Elimination of live POC adjacent to infection sites would further reduce the potential for *P. lat.* propagation. This strategy has been implemented on the Gold Beach Ranger District, Siskiyou National Forest (Gee, 1993). In this case, all POC within a distance equivalent to five times the crown radius of the infected tree(s) have been removed.

There will often be portions of the RR infested with *P. lat.* that have POC too small to be girdled. One management approach could be to girdle POC greater than six inches dbh, slash smaller POC (down to 1 inch in diameter at 1 foot), and use prescribed fire to kill POC that are too small to slash. The prescribed fire treatment utilized could be a broadcast burn, underburn, swamper burn, or whatever application of fire best fits the objectives for the riparian management area. Of course, this would only be applicable where prescribed fire is consistent with RR objectives. Due to the sensitivity surrounding the use of herbicides, it is recommended that they not be utilized in removing POC.

No commodity extraction of POC should occur prior to a watershed analysis. After a watershed analysis is complete commodity extraction could occur if it is consistent with objectives identified in the watershed analysis.

2. Late-Successional Reserves

A second area of concern are areas containing *P. lat.* that are within LSRs. Management objectives for LSRs are to protect and enhance conditions of late-successional and old-growth forest ecosystems which serve as habitat for late-successional and old-growth-elated species, including the northern spotted owl (USDA-USDI, 1994). In those areas where POC provides a significant portion of the forest canopy, *P. lat.* could, over time, contribute to canopy loss and be detrimental to maintaining quality LSR habitat. Treating the pockets of *P. lat.* that occur within LSRs will have some short-term impact on canopy cover and species diversity; but by isolating or eliminating the diseased area or areas, POC may be retained inside the LSRs and contribute to overall species diversity.

As stated above under RRs, considerations for snags, down woody material, and their associated resource values are necessary in LSRs. Consultation with wildlife biologists and other resource specialists will determine management opportunities. Creative management can reduce *P. lat.*, enhance the amount of snags and down woody material, ensure snag and down woody material recruitment, and perhaps even provide some timber volume for commodity production.

The intent is to isolate *P. lat.*-infested areas and to reduce the potential for spread of the pathogen via root grafts. This could be accomplished by removing green POC from around the periphery of disease centers. This would accomplish two objectives. POC populations would be separated into populations of infected and uninfected POC, and the possibility of locating resistant POC within the infested areas would be retained. The possibility exists that girdled POC or severed POC

stumps may remain alive due to root grafting. However, it has been shown that most roots not directly involved with root grafts die (Bornamm, 1966). Therefore, even if the severed or girdled POC stumps remain alive, benefit can be achieved by reducing the receptive sites for *P. lat.* (Gordon, 1974).

The emphasis in LSRs is not on timber as a commodity. It is recommended that POC harvest or salvage occur only after realizing other resource objectives which might benefit from large woody material input from POC. Snags can serve a variety of purposes for wildlife including, but not limited to, nesting platforms, feeding substrates, and roosting sites. While the decay rate of POC snags is not clear, a related species, western red cedar, has been shown to be the most persistent snag in forests of Coast Range (Cline, 1977). While this may provide for long-term utilization of POC snags for the uses previously mentioned, slow decay rates may reduce the opportunity for cavity nesters to occupy POC snags. Wildlife use of POC snags appears not as high as that of pines or Douglas-fir, but this is likely partially offset by the longevity or the snags (Jimerson, 1989). The level of large woody material input from POC will have to be determined through an interdisciplinary analysis and occur on a site-specific basis.

Preliminary data from USFS ecology plots in the POC series shows that while stands have the potential to become dominated by POC, there are generally other conifers and hardwoods present that contribute to stand structure and canopy closure (Atzet and McCrimmon, 1992). Data combined from all the plots in the POC series indicated that POC is normally not the dominant tree in those stands. If this situation exists, then removal of the live host of *P. lat.* may be possible without significant loss of canopy cover in the POC series that occur in spotted owl habitat.

3. Matrix

Most timber harvest and other silvicultural activities will be conducted in that portion of the Matrix with suitable forest lands (USDA-USDI, 1994). Stands in the Matrix can be managed for timber and other commodity production, but they also have an important role in maintaining biodiversity. Silvicultural systems for stands in the Matrix should provide for the retention of old-growth ecosystem components such as large trees, snags and down logs, and depending on site and forest type, a diversity of species (Thomas et al., 1993). Green tree retention is a significant component in the management of Matrix lands. Green trees can be retained, both as individuals and in well-distributed patches. Patches of green trees of various sized, ages, and specie swill promote species diversity and may act as refugia or centers of dispersal for many organisms including plants, fungi, lichens, small vertebrates, and arthropods (Esseen et al., 1992). Patches of green trees may also provide protection for special microsites such as seeps, wetlands, and rocky outcrops.

POC should be treated the same as any other commercial species in the Matrix. Special considerations for this species are identified later in the document (see following Mitigating Measures for Timber Sale and Service Contractors). Rather than girdling and leaving POC as mentioned above in the RRs and LSRs, merchantable POC can be removed for commodity production. It is recommended that areas of *P. lat.* be targeted for POC harvest. Residual uninfected POC can be left as part of the green tree retention previously described. Slashing of small POC and prescribed fire may be used to eliminate unmerchantable POC from infested areas. This removal of the host species could reduce the presence of *P. lat.*; and if POC is eliminated from a diseased site for more than 5 years, there is the potential for *P. lat.* to die out. This 5-year-time-period is for the drier portions of the POC range. More mesic sites, such as those found in the Coos Bay District, will require a longer period of POC absence in order for *P. lat.* to die out.

Monitoring will be essential to track the existence of *P. lat*. One potential monitoring technique is to plant small quantities of POC in areas suspected of still being infested. This could be done as a cluster plant with other species not susceptible to *P. lat*. If the disease is still present, mortality in the POC would show up quickly and could be documented in stocking surveys at the end of the first growing season. If no POC mortality occurs, the excess conifers resulting from the cluster plant could be removed (Viets, 1993).

D. Provide POC as a primary forest product.

POC can be exported as whole logs from Federal lands. A species can be exported if it can be shown that domestic use of the timber is absent or minimal (Land, 1992). Hinoki *(Chamaecyparis obtusa)* is used in the construction of homes and temples in Japan. Due to decreasing populations of hinoki, the demand for POC has increased. Five dollars per board foot or $5,000 per thousand have been paid for POC (Brattain and Stuntzer, 1994).

Matrix lands infested with *P. lat.* should be targeted for salvage operations as soon as possible. Reserves should be considered for salvage only after the appropriate analysis has been completed (watershed analysis for RRs or management plan for LSRs). It is recommended that mortality salvage operations occur within 3 years of the death of any POC in the Matrix, and as soon as possible in other areas as long as the salvage is consistent with management objectives. The export value of POC was reduced after 3 years due to a decrease in grade (Zobel et al., 1985). This contrasts with POC killed by fire. Fire-killed trees can retain their merchantability for a longer period of time due to exterior charring. In addition to salvage, green POC should be removed from around the infested area to reduce the possibility of disease transmission via root grafts. The distance for removal of POC would have to be determined on a site-by-site basis.

Areas not infested by *P. lat.* need not be off limits to timber harvest. However, steps must be taken to reduce the probability of initial infection. Mitigating measures for timber sale and service contracts are listed in Section VI below. It is anticipated that a helicopter would frequently be the logging system of choice, but conventional systems could also be used when they are consistent with management objectives for the area.

E. Public Involvement

Public education and media involvement should be incorporated into our guidelines. Groups such as the Oregon Natural Resource Council, the Western Environmental Law Center, Inc., the Siskiyou Regional Education Project, the Nature Conservancy, and the Sierra Club have indicated interest in POC management. Involvement and coordination with private landowners and other neighbors will provide better awareness of *P. lat.* problems, reduce the potential for new *P. lat.* infections, and help organize the management of POC and *P. lat.* across ownerships. Upon adoption of a rangewide POC management plan, a news release could be issued to the media. There has already been interest shown by members of the press as the information regarding Pacific yew susceptibility to *P. lat.* has become more widely known. Educational signs identifying road closures for POC and *P. lat.* management should be posted in all areas containing POC. Lectures to interested groups could also enhance the image of the BLM POC management program. A brochure similar to the USFS pamphlet, Port-Orford-Cedar Root Disease (FPM Report #294), should also be developed by BLM.

F. Develop a budget and implementation schedule for the POC Program.

POC areas should be mapped, and lists of the Operations Inventory Units containing POC should be developed. The next step is to develop lists of infested and uninfested areas containing POC.

Without an accurate inventory of POC and *P. lat.* occurrence, successful management of POC and *P. lat.* has little chance of success. The suggested procedure is as follows:

Inventory	General survey for POC and *P. lat*. Determine the extent of the POC and *P. lat.* (Are all POC infected?). Map areas with and without *P. lat*.
Implementation Plan Develop	M*S and GIS: Input data into MICRO*STORMS and GIS. Development GIS maps of POC and *P. lat.* areas and input recommended treatments into M*S database.
Plan Monitoring, Ongoing Adaptive management, and Modification	

Future needs will focus on developing site-specific management plans for all areas containing POC, and monitoring POC areas to see if the disease has been isolated or eliminated from infected areas and fprevented from spreading into disease-free areas.

VI. MITIGATING MEASURES FOR TIMBER SALE AND SERVICE CONTRACTS

It appears that when areas of POC and *P. lat.* are accurately mapped and mitigation measures are implemented, the successful spread and establishment of the disease into new watersheds is a rare event. The use of effective mitigation measures, combined with a low risk of establishment following the spread of the disease, has prevented the spread of the disease into uninfested watersheds in California (Kliejunas, 1991).

A. Restrict road building and log hauling to the dry season unless the contract calls for cleaning the vehicles to prevent/reduce import or export of the root disease. This will lessen the chance of infested soil adhering to equipment and vehicles and consequently from being transported to uninfested areas.

B. Road design: When feasible, outslope the roads or use crushed rock to keep the soil in place. A slight outslope is best as the soil landing on the fill slope has a low probability of ending up in streams. Insloped roads will cause soil to end up in the ditch and eventually enter into streams, placing downstream POC populations in jeopardy. Culvert and waterbar placement should also divert water from areas where POC exists.

C. In POC areas, do not allow blading into road ditches upstream from the uninfested areas. Blade to the fill slope only. Do not allow sidecasting where sidecast material could reach the stream channel.

D. Wash with chlorine bleach and water or require steam cleaning or high pressure water treatment for all machinery and vehicles prior to entry into the uninfested project areas. Require the same washing and cleaning for machinery and vehicles prior to departure from infested sites. The ration of chlorine bleach and water for vehicle washing is 12 ounces of bleach per 1,000 gallons or water. Charge the vehicle cleaning to the timber sale or whatever activity requires entry into the POC area. See Appendix 2 for additional information.

E. Gate or barricade roads in areas containing POC, both uninfested and infested, when consistent with other resource objectives. This prevents vehicle introduction of *P. lat.* into uninfested areas and the transport of *P. lat.* out of infested areas. Lack of access also reduces the potential for theft and can be incorporated into the resource area road closure policy designed to benefit resources other than timber such as terrestrial wildlife, fisheries, and other values identified as part of the Aquatic Conservation Strategy.

F. In timber sales containing infested and uninfested areas, harvest uninfested areas first so that the equipment does not become contaminated and the contamination moved to uninfested areas.

G. Use chlorine bleach and water or steam cleaning to wash chokers and equipment if a helicopter yarding system is used.

H. Have an interdisciplinary team review and make recommendations to the area manager on all activities in POC areas. Fisheries projects, riparian enhancement, and recreation site development are examples of undertakings that should have interdisciplinary team review.

I. Remove the belly plate from all tractors that have worked in infested areas, and steam clean or wash the tractors with chlorine bleach and water prior to leaving the site. In uninfested areas, steam clean or wash all skidding, yarding, and hauling equipment prior to entering the site. See Appendix 3 for specific vehicle parts that may require cleaning.

J. Do not allow POC bough cutting until the following steps are completed:

1. Inventory for POC and *P. lat.*
2. Determine if bough cutting is consistent with management objectives for the area.
3. Only allow bough cutting in small areas where administration and law enforcement have easy access.

K. Develop monitoring plans for all POC areas. This could include such things as checking contract diaries for rainfall events during logging and activities outside of the scope of the contract.

L. Coordinate with the USFS, state and county forestry departments, private groups, and individuals that have an interest in POC management.

M. Require roadside brushing: (all distances are slope distances)

1. Upslope: Cut all POC within 20 feet of the road edge; if cut slopes are greater than 5 feet in height, remove POC only between the road edge and the top of the cut slope.

2. Downslope: All POC within 50 feet of the road edge, downslope from the stream crossing, and all POC that have roots within the stream channel should be killed where the stream channel intersects the road right-of-way.

These disturbances are used as examples and can be modified to fit a particular situation. In addition, this is not mandatory and should only be used when there is a high likelihood of importing *P. lat.* into a project area where other mitigating measures have low potential for success.

N. Reforestation: Plant POC at 25-foot spacing or in approximately 1-tree clusters at 100 to 150 foot spacing. This does not apply to planting mentioned above where presence of *P. lat.* is being determined.

O. Precommercial thinning: Allow for adequate spacing between POC in precommercial thinning contracts. This will lessen the chance of root grafting and potential pathogen transmission. Use 25 feet as a spacing guideline in precommercial thinning.

P. Commercial thinning: Allow for adequate spacing between POC in commercial thinning contracts. Use 50 feet as a spacing guideline in commercial thinning sales. This will lessen the chance of root grafting and potential pathogen transmission.

Q. Thinning can also be designed so that POC is left in tight clusters 100 to 150 feet apart. The intent is to minimize the potential for root grafting between clusters of POC.

R. Endhauling/slide removal: Prior to removing soil and other material, determine is either the source of the destination of the material is infested with *P. lat.*

APPENDIX 1

SYNOPSIS OF REGIONS 5 AND 6 PORT-ORFORD-CEDAR COORDINATING GROUP ACTION PLAN

A. INVENTORY AND MONITORING

Goal: Develop a standard inventory and monitoring system for regional use.

Action items/objectives:

1. Inventory to establish POC locations.
2. Inventory to establish current boundaries of infection.
3. Monitor to establish the rate of spread, locally and species-wide.
4. Evaluate the effects of mitigating measures.

B. RESEARCH AND ADMINISTRATIVE STUDY

Goal: Develop a coordinated and prioritized approach to administrative studies and encourage research by other parties that is responsive to the management of POC.

Action items/objectives:

1. Test strategies of control for efficacy.
2. Encourage research units to initiate studies on identified research needs in the following priority:
    a. Develop methods to detect the pathogen in soil and water.
    b. Determine the requirements of the pathogen for survival and dispersal.
    c. Study measures to eliminate the fungus from areas of incipient infection.
    d. Investigate the existence of resistance to the pathogen within the range of POC.
    e. Determine to what extent genetic variation exists in POC.

C. PUBLIC INVOLVEMENT AND EDUCATION

Goals: Develop a coordinated regional effort to keep the public informed of the progress of POC management and incorporate public involvement in the process.

Action items/objectives:

1. Keep interested groups up-to-date on the progress of POC management.
2. Provide opportunities for interested groups and individuals to contribute to the coordinating team.

D. MANAGEMENT

Goals: Develop an agreed-upon and coordinated program to manage POC in the presence of root disease and generate criteria and mechanisms to determine the risk of spread.

Action items/objectives:

1. Continue to refine and update the risk assessment model used in evaluating projects.

2. Develop strategies for the management of the following activities:

    a. Timber sales

    b. Road construction and management

    c. Reforestation and stand management

    d. Other activities that have potential for earth-moving activities (such as quarry development) in stands containing POC.

3. Develop a system or method for sharing information.

APPENDIX 2

GENERAL SPECIFICATIONS FOR A WASHING STATION

Purpose: The purpose of the washing station is to remove as much soil and organic matter from vehicles as possible to prevent/reduce the spread of *P. lat*. Vehicles and equipment should be sanitized prior to entering uninfested areas and prior to departure from infested areas. The intent is to reduce the spread of *P. lat.* into uninfested areas. Sanitation can be accomplished with a mixture of chlorine bleach and water or by steam cleaning. The ration of chlorine bleach to water is 12 ounces of bleach per 1,000 gallons of wash water.

When locating and constructing a washing station to clean vehicles and equipment, we need to minimize the chance that a "clean" truck will be re-exposed to infested material near the washing site. There are two ways this can happen. One is if the truck travels through an area where "unclean" trucks are also traveling. This can be minimized by proper location of the washing station. If some common travel ways are used, efforts need to be made that will reduce the chance of picking up soil. This can be accomplished by rocking the common road surface or hardening it in some other fashion. Reducing the amount of water used for dust abatement will lessen the amount of mud which may also prove useful.

The second way a "clean" truck could become a carrier again is by traveling through wash water and mud at the washing station. Proper construction of the site will eliminate this risk. Runoff of the wash water needs to drain away from the wash site and away from the travel route to and from the site. Wash water must not be allowed to drain into stream channels. The actual washing site needs to be elevated so that the trucks are not sitting in mud and wash water. This could be accomplished by ramps or by building a sufficiently high rocked surface on which the trucks can travel. The length of the rocked surface wash area should be at least 1.5 times the length of the trucks that will be using it. This will allow the trucks to travel on a non-contaminated surface for a short distance after being washed and reduce the chances of picking up infested soil from the washing. The gravel used for rocking should be of sufficient size to allow good percolation of water and soil into the subsurface. Accumulations of water and soil on the surface should be avoided. This last point also affects the depth of the rocked road surface. The amount of washing and the number of trucks using the site will also influence the depth.

The type of equipment used for washing needs to be sufficient to remove all soil and organic matter that is clinging to the trucks. The actual water pressure required can best be determined on the site. Each time a truck enters an uninfested site, it needs to be washed.

APPENDIX 3

EQUIPMENT CLEANING CHECKLIST

The purpose of this checklist is to provide guidance to contract administrators in the enforcement of equipment cleaning contract provisions for *P. lat.* control. This is a guide to direct administrators to specific areas on equipment that are likely to accumulate soil and should be check. Onsite judgments still need to be made about overall equipment cleanliness. This will be a new procedure for many purchasers and they need to be convinced of the seriousness of the situation prior to beginning the contract. Effective enforcement procedures (such as shutdowns) must be available to the contract administrator.

Does the equipment appear to have been cleaned?

Is the equipment clean of clumps of soil and organic matter?

RUBBER-TIRES VEHICLES	**TRACK-LAYING VEHICLES**
Tires	Tracks
Wheel Rims (underside and outside)	Road Wheels
Axles	Drive Gears
Fenders	Sprockets
	Roller Frame
	Track Rollers/Idlers
ALL VEHICLES AS APPROPRIATE	
Frame or Undercarriage	
Belly Pan (inside)	
Stabilizers (jack pads)	
Grapple and Arms	
Dozer Blade or Bucket and Arms	
Ripper	
Brush Rake	
Winch	
Shear Head	
Log Loader	
Water Tenders (empty or with treated water)	

APPENDIX 4

PROJECT ANALYSIS AND IMPLEMENTATION
(from the USFS POC Action Plan)

Threshold of Concern:

	RISK		
% of POC	Low	Medium	High
Low (0 to 5%)	No concern	No concern	High concern
Moderate (5 to 20%)	No concern	High concern	High concern
High (>20%)	High concern	High concern	High concern

Defining Risk:

Low	Below roads: No POC within 500 feet. Above roads: No POC within 50 feet.
Moderate	Below roads: POC may be within 100-500 feet of the road. Above roads: No POC within 50 feet.
High	Below roads: POC within 100 feet. Above roads: POC within 50 feet.

Objective A: Prevent/reduce the import of disease into uninfected areas.

Objective B. Prevent/reduce the export of disease to uninfected areas.

Objective C: Minimize increases in the level of inoculum or minimize the rate of spread in areas where the disease is endemic. If possible, identify the probable mechanism of spread; whether by introduction of spores or by root grafting.

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REFERENCES

Atzet, T.A. 1979. Description and classification of the forests of the upper Illinois River drainage of southwestern Oregon. Ph.D. Dissertation, Oregon State University, Corvallis. 211 p.

Atzet, T.A. 1993. Personal communication. Siskiyou National Forest, Grants Pass, OR.

Atzet, T.A. and L. McCrimmon. 1992. Preliminary Snag Distributions for the Port-Orford Cedar and Tanoak Series. USDA-FS, Siskiyou National Forest, *unpublished data on file*, Grants Pass, OR.

Atzet, T.A. and D.L. Wheeler. 1984. Preliminary Plant Associations of the Siskiyou Mountain Province. USDA-FS Pacific Northwest Region, Siskiyou National Forest, Grants Pass, OR. 315 p.

Bormann, F.H. 1996. The Structure, Function, and Ecological Significance of Root Grafts in *Pinus strobus* L. Ecological Monographs 36:1–26.

Brattain, D. and R.E. Stuntzer. 1994. The Port-Orford Cedar Alliance: A Response to the ONRC's Proposal to List POC. Smith River, CA. 144 p.

Cline, S.P. 1977. The Characteristics and Dynamics of Snags in Douglas-Fir Forests of the Oregon Coast Range. M.S. Thesis, Oregon State University, Corvallis. 106 p.

DeNitto, G. 1991. Evaluation of Sanitation of Port-Orford-cedar Along Grayback Road, Happy Camp Ranger District. USDA-FS, Pacific Southwest Region Technical Report N91-7. 3 p.

Denitto, G. and J.T. Kliejunas. 1991. First Report of *Phytophthora lateralis* on Pacific Yew. Plant Disease 75(9):968.

Edwards, S.W. 1983. Cenozoic History of Alaskan and Port-Orford *Chamaecyparis* Cedars. Ph.D. Dissertation, University of California, Berkeley, CA. 271 p.

Gee, E. 1993. Personal communication. USDA-FS Siskiyou National Forest, Gold Beach Ranger District, OR.

Gordon, D.E. 1974. The Importance of Root Grafting in the Spread of *Phytophthora* Root Rot in an Immature Stand of Port-Orford Cedar. M.S. Thesis, Oregon State University, Corvallis. 116 p.

Gordon, D.E. and L.F. Roth. 1976. Root Grafting of Port-Orford Cedar: An Infection Route for Root Rot. Forest Science 22(3):276–278.

Greenup, M. 1991–92a. Personal communications. USDA-FS Siskiyou National Forest, Grants Pass, OR.

Greenup, M. 1992b. Port-Orford Cedar Plan Status Report for Fiscal Year 1991. USDA-FS Siskiyou National Forest, Grants Pass, OR.

Hadfield, J.S., Goheen, D.J., Filip, G.M., Schnitt, C.L., and R.D. Harvey. 1986. Rot Diseases in Oregon and Washington Conifers. USDA-FS Pacific Northwest Region, Forest Pest Management, Portland, OR.

Hansen, E.M. 1994. Personal communication. Oregon State University, Department of Botany and Plant Pathology, Corvallis, OR.

Hansen, E.M., Hamm, P.B., and L.F. Roth. 1989. Testing Port-Orford Cedar for Resistance to *Phytophthora*. Plant Disease 73:791–794.

Harlow, W.M. and E.S. Harrar. 1969. Textbook of Dendrology. Fifth Edition. McGraw-Hill, New York, NY. 512 p.

Hawk, G.M. 1977. A Comparative Study of Temperate *Chamaecyparis* Forests. Ph.D. Dissertation, Oregon State University, Corvallis, OR.

Jimerson, T.M., and R.M. Creasy. 1989. A Preliminary Classification for Port-Orford Cedar in Northwest California. USDA-FS Six Rivers National Forest, Eureka, CA.

Jimerson, T.M. and R.M. Creasy. 1991. Variation in Port-Orford Cedar Plant Communities Along Primary Environmental Gradients in Northwest California. USDA-FS, Six Rivers National Forest, Eureka, CA.

Kliejunas, J.T. 1991. Court Testimony, Northcoast Environmental Center and California Native Plant Society vs. Barbara Holder, F. Dale Robertson, USFS, Blue Lake Forest Products, Inc., and Murphy Creek Lumber Company; Civil #S-91-0078-EJG; United States District Court for the Eastern District of California.

Kliejunas, J.T. 1992. Personal communication. USDA-FS, San Francisco, CA.

Lang, Frank. 1992. Port-Orford Cedar: Nature Notes (transcript). Jefferson Public Radio, Ashland, OR.

Martinson, S. 1994. Personal communication. USDA-FS, Portland, OR.

Millar, C.I., Delaney, D.A., Westfall, R.D., Atzet, T., Greenup, M., and T.M. Jimerson. 1991. Ecological Factors as Indicators of Genetic Diversity in Port-Orford Cedar: Applications To Genetic Conservation. USDA-FS, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA. 3 p.

Millar, C.I. and K.A. Marshall. 1991. Alozyme Variation of Port-Orford Cedar (*Chamaecyparis lawsoniana*): Implications for Genetic Conservation. Forest Science 37(4):1060–1077.

Ollivier, L.M. 1992. Habitat Relationships of Aquatic Amphibians in the Smith River Drainage. Master's Thesis, Humboldt State University, Arcata, CA. 155 p.

Ostrofsky, W.D., Pratt, R.G., and L.F. Roth. 1977. Detection of *Phytophthora lateralis* in Soil Organic Matter and Factors That Affect its Survival. Phytopathology 67:79–84.

Robison, G.E. and R.L. Beschta. 1990. Identifying Trees in Riparian Areas That Can Provide Coarse Woody Debris to Streams. Forest Science 36(3):790–801.

Roth, L.F., Harvey, R.D., and J.T. Kliejunas. 1987. Port-Orford Cedar Root Disease. Forest Pest Management Report Number 294. USDA-FS Pacific Northwest Range and Experiment Station, Portland, OR.

Schoeppach, W. 1991. Personal communication. USDA-FS Klamath National Forest, Happy Camp Ranger District, CA.

Thomas, J.W. and Raphael, M.G. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. The Report of the Forest Ecosystem Management Assessment Team, Portland, OR. 848 p.

Torgeson, D.C., Young, R.A., and J.A. Milbrath. 1954. *Phytophthora* Root Rot Diseases of Lawson Cypress and Other Ornamentals. Bulletin 537, Oregon State College Agricultural Experiment Station, Corvallis, OR. 18 p.

USDA-FS and USDI-BLM. 1994. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR. 1066 p.

Viets, R. 1993. Personal communication. USDI-BLM, Medford District, Medford, OR.

Zobel, D.B. 1979. Seed Production in Forests of *Chamaecyparis lawsoniana*. Canadian Journal of Forest Research 9:327–335.

Zobel, D.B. 1990. *Chamaecyparis lawsoniana*: Port-Orford Cedar. In: Burns, R.M., Honkala, B.H., technical coordinators. Silvics of North American: Volume 1, Conifers. USDA-FS Agricultural Handbook 654, Washington, D.C. 88–96 p.

Zobel, D.B., Roth, L.F., and Hawk, G.M. 1985. Ecology, Pathology, and Management of Port-Orford Cedar (*Chamaecyparis lawsoniana*). General Technical Report PNW-184, USDA-FS Pacific Northwest Range and Experiment Station. 161 p.

Appendix 2: Summary of Agency Actions for Fiscal Year 2001–2002 Under the Existing Direction for Port-Orford-Cedar

This information is presented to help guide assumptions about how the No-Action Alternative is expected to be implemented. Although the No-Action Alternative generally relies on site-specific analysis to select management actions from a menu of possible actions to meet an overall objective, a reasonable assumption about the future level and intensity of management actions can be made by examining what the Agencies have done under this direction in the past. The effects of the No-Action Alternative (Alternative 1) described in Chapter 3&4 and summarized in Chapter 2 are based in part on recent accomplishments noted in this appendix, and an expectation that a similar scope and intensity of management practices will continue.

Overview of Current Port-Orford-Cedar Program Implementation

In May 1987, and interregional Port-Orford-cedar (POC) Coordinating Group was formed by the BLM and FS. This group continues to serve as a programmatic technical coordination team composed of the BLM POC Coordinator, FS POC Manager, pathologists, ecologists, and geneticists, as well as administrative unit representatives from Oregon and California.

The existing POC program is basically made up of five efforts on the part of the Federal agencies: (1) decreasing the spread of the disease, (2) increasing the survival of the host, (3) producing valued by-products from its treatment, (4) considering potential impacts on other forest activities resulting from implementing *Phytophthera lateralis* (PL) mitigations, and (5) monitoring and communication.

1. Decreasing Spread of the Disease

A. Roadside Sanitation: The removal of roadside POC is a technique to prevent/reduce new infections along roads in currently uninfested areas, or if already infested, minimizing the amount of inoculum available to be transported to other uninfested road segments. Both agencies are currently using this tool in certain, site-specific forest projects. Treatment width varies in its application.

B. *Phytophthora lateralis* Eradication: By using a combination of treatments (such as removing the host, opening a stand to direct sunlight, using fire to lessen the amount of PL in soil, and planting different replacement species), PL may be eliminated from treatment areas eventually allowing POC to reestablish. Because its effectiveness has not been proven over the long term, neither agency is currently utilizing this technique.

C. Improve Roads to Decrease Risk, Especially within Key Habitats: Both agencies attempt to upgrade roads on a site-specific project basis to minimize movement of the pathogen on forest roads. Available funding, however, frequently limits this technique.

D. Water Sources: Water is frequently used in many forest activities, including road construction, dust abatement, and fire control. Water sources, however, may be contaminated with PL and the pathogen may be spread across the forest environment by the

movement of water. Federal agencies have recommended and widely implemented treating such water with chlorine bleach and have largely mapped possible contaminated water sources within the range of POC. However, keeping maps of uninfested water sources current is not always possible with limited resources.

E. Road Design and Maintenance: Few forest roads are being built within the range of POC on Federal lands because of listed fish species and the decline in timber harvest levels. New road design specifications for sloping and surfacing have been implemented using recommended transportation management objectives when feasible. Existing Federal forest roads are continually being evaluated on a project basis for various treatments including upgrading surfacing, gating, or closing.

F. Road Use Restrictions: Although not always desirable or possible, closing or gating roads are effective methods for limiting the introduction of the disease.

G. Washing Vehicles: Even though washing can be a successful treatment for lessening the amount of PL spread across forest environments, it is difficult to apply efficiently. Realistic locations for installing washing stations are often not available, and control of use (who and when) is not always an option because of right-of-way permit requirements.

H. Restricting the Sale of Forest Products: Some administrative units have noticed a correlation between the sale and harvest of POC boughs and the spread of PL. These units have restricted or discontinued the sale of POC boughs.

2. Increasing Survival of the Host

A. Resistance Breeding: Based upon general forest resource management objectives to promote and sustain forest health, biodiversity, and productivity, the Forest Service (FS) and BLM have both committed time and funding to a resistance breeding program currently underway at the FS Dorena Genetics Resource Center located at Cottage Grove, Oregon. Related research is also being conducted at Oregon State University in Corvallis. A 5-year memorandum of understanding was recently signed between the two Agencies to continue interagency support for the POC breeding program (see additional details below).

B. Plant Spacing: Even though in the past, very few reforestation projects were done, wide spacing of POC seedlings became largely a moot consideration. But with large reforestation stock needs resulting from large fires such as the Biscuit Fire, seedling needs will increase. Individual POC seedlings are planted at a 25-foot spacing or in clusters 100- to 150-feet apart.

C. Precommercial and Commercial Thinning Spacing: Provisions of precommerical thinning contracts usually include requirements for leaving POC as leave trees whenever possible and creating wide distances between them. Federal commercial thinnings have also been implemented using recommended spacing guidelines, or have been used to remove POC growing adjacent to roads in or on the perimeter of treatment areas.

3. Producing Valued By-Products from Treatments

A. Bough Sales When Sanitizing: Harvesting boughs from POC trees that have already been cut during roadside sanitation treatments is currently being conducted only on the Medford District of the BLM.

B. Snag/Coarse Woody Debris Retention: Both agencies are following general snag and coarse woody debris retention direction of the "Northwest Forest Plan" (1994). POC is not specifically identified as a species targeted for retention.

C. Non-Port-Orford-Cedar Special Use Permits and Other Collections: Both Agencies issue and promote special use permits for the harvesting of other special forest products. Some examples include the sale of non-POC boughs, beargrass, and the collection of cones. The actual harvest of these commodities, however, sometime involves using forest roads during wet periods and, if not closely regulated, may take place in infested areas. Agency responses have typically been to prohibit special use permits on infested sites on a seasonal basis. It should be noted that noncompliance of the conditions of the special use permits and limited law enforcement abilities or contract oversight frequently allow the opportunity for spread of PL on forest roads. Aggregate material is also routinely sold by both agencies, sometimes where the material may be contaminated with PL.

4. Potential Impacts on Other Forest Activities Resulting from Implementing *Phytophthora lateralis* Mitigations

A. Mining: Activities likely to cause significant disturbance of surface resources require a plan of operation, leading to Agency requirements for reasonable terms and conditions. Mining operators can be required to follow the same mitigation techniques as the Agencies require of themselves, contractors, and pemittees.

B. Incorporating Port-Orford-Cedar Concerns When Planning Other Projects: The geographic information system is the basic planning tool used for identifying currently known locations of both POC and PL in relation to proposed project locations. Other ongoing programs, such as the issuance of special use permits, consider these actions and the possible spread of the disease. POC concerns are also identified in agency transportation management plans and are considered in relation to possible road management activities, including road construction, maintenance, and use.

5. Monitoring/Education

A. Monitoring: Within the FS, implementation and effectiveness monitoring of POC projects are conducted in accordance with respective land and resource management plans. Elements of FS monitoring programs may include conducting annual surveys for identifying new locations of POC root disease, estimating overall trends of rates of spread of the disease, evaluating the risk of spread for proposed projects and follow-up after project completion, and collecting data to estimate intensity of infested areas. For the three BLM districts, resource management plans require all projects to conform to the "Port-Orford-Cedar Management Guidelines" (1994). These Guidelines state that when inventorying POC and PL areas, effectiveness of management of the pathogen and

disease control should be monitored for at least 5 years in the drier portion of the range of POC and for longer periods where climatic conditions are wetter. Both agencies have sometimes not met timing recommendations for reinventorying locations of POC and PL.

B. Public Education: The FS and BLM have prepared a POC communication plan. The plan identifies specific methods for possible education efforts including press releases, posters and pamphlets; public field tours; presentations to user groups; a POC Newsletter; coordination with Tribal groups; creating POC internet websites; conducting public symposiums; preparing and installing information signs on trailheads, gates, and other closures; holding coordination meetings with industrial and small woodland landowners; and supplying maps of road closures. Actual implementation of these tasks varied widely depending on available staff time, budget, or legal constraints.

Existing Programmatic Actions

Interagency Port-Orford-Cedar Breeding Program

The FS and BLM are supporting an ongoing program at the FS Dorena Genetic Resource Center, Cottage Grove, Oregon, to identify the amount and type of genetic resistance in natural populations of POC to the introduced PL pathogen. Wild, individual trees are selected to test for genetic resistance, with the goal to produce resistant seed to restore and sustain POC and its function in the ecosystem. Users of this seed are currently limited to Federal and cooperating agencies, although there is obviously a demand from the private sector.

With assistance from Oregon State University, work is continuing to develop durable resistance (that is to survive long term) while retaining the broad genetic diversity within the species. Over 11,000 field selections throughout the POC range have been made. Using a stem inoculation technique, vegetative material collected from these trees have been screened for resistance to PL; these same trees are now being retested using a root inoculation technique to help validate and refine the initial screening.

Other elements of the POC program involve propagation; growing, cultivating, and maintaining containerized trees; breeding; seed production; evaluation using validation plots; analysis; data management; record keeping; and technology transfer.

Because POC bears cones at age 4 or 5, the program is advancing quickly. In the fall of 2002 the first large cone crop was collected from resistant nursery stock and the opportunity now exists to use this seed in some breeding zones. Resistant seed is being sown in early 2003 to be used to restore areas burned in the Biscuit Fire on the Siskiyou National Forest (NF).

Agency Wildfire Management Implications

Firefighting activities have commonly involved the use of water for suppression purposes and the use of vehicles to transport people and equipment within and around the fire perimeter. Prior to the fire season, the FS and BLM have both inventoried and updated possible water sources and have identified potentially infested water sources. When a wildfire breaks out, this information has been communicated to fire resource advisors and, when safely possible,

the use of either uninfested or treated water has been encouraged. If present, propagules of the pathogen have be killed in contaminated water by treating it with chlorine bleach. Frequent and strategic washings of fire vehicles and equipment have also been recommended.

Updating Mapping of Port-Orford-Cedar/*Phytophthora lateralis* Locations

From 1990 to 1996, the FS and BLM took up the substantial task of initially mapping range-wide on federally-administered lands with known and recently observed locations of both POC and PL. Utilizing existing data, road surveys, aerial photo interpretation, and annual aerial surveys, maps were compiled and transferred to the geographic information system and are now available at both the administrative-unit and range-wide scale. In Fiscal Years 2001 and 2002, changes have been noted and geographic information system layers have been revised as needed. This spatial and temporal information is now routinely used for project planning.

Specific Actions by Administrative Unit

Siskiyou National Forest. The Siskiyou NF recently issued a POC policy that recommended to employees, contractors, and the general public, when in areas within the range of POC, to use a range of mitigation actions to reduce the risk of import, export, or spread of PL. Actions recommended included washing vehicles prior to entering any areas of uninfected POC on NF lands, avoiding use of roads closed or gated for POC protection, and cleaning footwear when work is completed in infested areas.

In Fiscal Year 2001, the Siskiyou NF reported programmatic funding of approximately $238,000 for a POC manager to serve all NFs within the range of POC, as well as district or zone POC coordinators, printed educational materials, and other supplies.

The Forest tracks individual projects that were active within the range of POC and, by each respective activity, reports implementation of disease control efforts and their success in discouraging the spread of the disease. Broad categories used are engineering and road management, timber harvest, and stand management actions.

Firefighting operations on the Biscuit Fire that occurred on the NF in the summer of 2002 included efforts to minimize spread of the root disease. Management actions taken, when safely possible, included daily washing of vehicles and equipment, and treating water with chlorine bleach. Approximately 9,900 gallons of chorine bleach were used on the fire.

Six Rivers National Forest. A biannual aerial detection flight conducted in Fiscal Year 2001 discovered a new root disease location and the road was closed and access restricted. No other new infections were reported.

In Fiscal Year 2002, the Six Rivers NF conducted a presuppression assessment ($20,000), closed a road, built a trail and moved a trail, and conducted surveys to move other trails into three natural resource areas ($32,310), and removed POC growing alongside forest roads ($8,000).

The Six Rivers NF also has a common-garden site located at the Humboldt Nursery facility, and the Forest has actively relocated trails and trailheads because of PL concerns, instituted

an active roadside sanitation program, installed a wash station at Orleans, California, developed a public education program, and installed and maintained POC resistance trails at two sites.

As on the Siskiyou NF, firefighting operations on the Biscuit Fire that occurred in 2002 included efforts to minimize spread of the root disease. Management actions taken, when safely possible, included daily washing of vehicles and equipment, and treating water with chlorine bleach.

Shasta-Trinity National Forest. POC root disease was confirmed to be on the Shasta-Trinity NF in 2001. The Forest incorporates POC management considerations into all of its management activities. Eradication treatments are scheduled to take place in 2003. Routine actions, when vegetation management is practiced where POC occurs, include detections, evaluation, and control of pest-caused damage. As an example, in Fiscal Year 2002, the Forest relocated and improved many road crossings ($20,400) as part of an active program to identify and address sites that are at high risk for introduction of PL. The Cedar Basin Research Natural Area is also actively managed to exclude the pathogen—inland POC populations there are genetically and ecologically distinct from coastal populations.

A large common-garden site on the Shasta-Trinity NF near Weaverville, California, is maintained and evaluated by the Forest to determine the physiological and genetic variation traits of the species.

Klamath National Forest. PL does not currently occur on lands administered by the Klamath NF, although there are many stands of POC. In Fiscal Year 2002, the Klamath NF provided $4,000 for field collections of vegetative material in support of the POC genetics program. The Klamath NF instituted and maintains roadside sanitation zones along Grayback Road and other areas, maintains an active disease monitoring program, and incorporates POC management considerations into all of its management activities.

Coos Bay BLM. Because the disease has been present on these federally-administered lands for the longest period of time (50 years) and its presence is pervasive across the Coos Bay District, effectively controlling the spread of the disease is especially difficult. Also, because of the BLM's system of existing reciprocal right-of-way agreements with private parties, road treatments and control are often not possible. The Coos Bay District implemented some road treatments in Fiscal Year 2001 which included roadside sanitation when practical, washing of vehicles (seasonally), closing selected roads, summer hauling on dirt roads, and prohibiting the cutting of POC boughs.

Because the disease has been present in this location for a long period of time, individual wild trees have also had the greatest opportunity to express genetic resistance (usually indicated by healthy POC surrounded by dead or dying POC). A large number of such trees from this District have tested positively for resistance and are now represented in the genetics program.

It is estimated that 80 percent of all green, living POC trees on the Coos Bay District are scattered and well-distributed away from streams and roads where mitigation measures are not needed. In these areas of low risk for infection, POC trees are expected to maintain their population. The District planted 2,000 non-resistant, POC seedlings on acres of low-risk

sites in Fiscal Year 2001 and 1,000 non-resistant, POC seedlings on 150 acres of low-risk sites in Fiscal Year 2002.

Medford BLM. Management for POC during Fiscal Year 2001 and 2002 on the Medford District BLM fell into two broad categories. The first category involved the collection of information, monitoring of sites infested with PL and its spread, and the continuation of efforts involving resistance to the root disease represented by selecting and testing individual POC trees.

The second category of POC management was the physical management of stands. Projects included treatments such as roadside treatments that removed POC, pre-commercial thinning treatments where POC was thinned to a wide spacing to reduce the spread of the root disease through root grafts, restrictions (such as seasonal gates), limited bough collection from uninfested areas, and the creation of POC snags. Other projects, such as trail construction, were designed to avoid POC locations.

Roseburg BLM. The Roseburg District continues to implement a series of management actions including washing vehicles and seasonal-use restrictions on certain roads, and prohibiting such activities as bough collecting at certain times of the year.

In Fiscal Year 2001, other associated District programs included an active program of mapping new locations of the disease, removal of hosts next to roads, continued identification of genetically resistant trees, and pursuing a proposed land exchange that would protect a serpentine plant community with POC.

In 1997, a 10-acre site on the District was planted to study POC range-wide silvicultural and genetic characteristics. The site is continually maintained and the POC, which originated from varying locales from Oregon and California, are being evaluated.

Appendix 3: Port-Orford-Cedar Standards and Guidelines in the Land and Resource Management Plans in Region 5, SEIS Cooperating Agencies, and the Siuslaw National Forest

Existing Direction — Six Rivers National Forest

The following is from the "Six Rivers National Forest Land and Resource Management Plan" (1995).

TREES WITH SPECIAL MANAGEMENT CONSIDERATION

[Page II-7] Strategies for reducing the risk of infection or spread of the disease will be integrated into all levels of planning and analysis for all areas that contain Port-Orford-cedar (POC). A risk analysis will be completed for all projects in watersheds containing POC. The Forest is utilizing disease control strategies.

[Page III-16] POC will be managed according to the Forest plan Standards and Guidelines that should provide an opportunity to prevent the spread of the root disease. Opportunities may occur to reestablish POC in plant associations which have been altered by root disease.

[Page III-16] The Forest Service implements an integrated pest management approach to dealing with forest pests (such as root diseases) which includes prevention, detection, evaluation, suppression, and monitoring. Pest management goals are directed toward reducing pest-related losses to levels that maintain a healthy forest environment.

Standards and Guidelines

[Page IV-51] *Pest Management*

1. No management action should be taken against endemic insects or Forest pathogens unless it can be determined that their occurrence has been exacerbated by human activities or spread would significantly compromise the integrity of the [Special Interest Area].

2. In order to reduce the spread of POC root disease, a risk analysis will be completed for all projects in watershed containing POC.

3. Access and/or projects proposed in uninfected watersheds which have potential risk for infection shall have a risk analysis performed.

Transportation and Facilities

[Page IV-53] 7. To prevent the introduction of POC root disease into uninfested areas of the North Fork Smith River Botanical Area, close Road 18N13 to vehicle access. Vehicle access into remaining areas (Road 18N09 and associated spur roads) is prohibited pursuant to 36 CFR 261.50; the prohibition exempts officials pursuant to 36 CFR 261.50(d)(4) and persons with a permit, special-use authorization, or operating plan, as defined in 36 CFR 261.2, issued by the District Ranger or higher-ranked authorized official. Access shall not be allowed during the wet season and during periods of heavy rain in the summer. If monitoring determines that these measures are not effective, additional mitigation measures will be considered and analyzed.

MANAGEMENT AREA 11-SPECIAL REGENERATION

Pest Management

[Page IV-54] 1. In order to reduce the spread of POC root disease, a risk analysis will be completed for all projects in watersheds containing POC.

FOREST-WIDE DIRECTION — PEST MANAGEMENT

Pest Management Program

[Page IV-129] *Goals:* Minimize resource damage from insects, disease, plants, and animals to help achieve resource objectives. Where this damage causes undesirable changes in vegetation, minimize resource damage through integrated pest management.

Direction: Of special concern to this Forest is POC root disease, *Phytophthora lateralis*. Special practices and monitoring are being implemented to maintain the viability of POC in the forest for genetic diversity, as well as economic and American Indian contemporary uses. Management is intended to be site specific, consistent, and visible to the public. Any activity that has a potential for spreading the root diseases fungus will require a formal analysis and prescription for controlling the spread of the fungus. This process is also required when Pacific yew is intermingled with POC or within the same project area as POC.

Port-Orford-cedar Root Disease

20-6: POC will be managed as a long-term component of plant associations where it is present.

20-7: Strategies for reducing the risk to POC from infection of the root disease will be integrated into all levels of planning and analysis (NEPA documents, watershed analysis, late-successional reserve assessments, wild and scenic river management plans, transportation planning, recreation planning and other activities or strategies) in all watersheds where it is present.

Transportation plans will evaluate the risk of spread of POC root disease through road upgrades, seasonal closures, permanent closures, maintenance, and decommissioning or obliteration.

Recreation plans will also evaluate the risk to POC and address access, trail, and road use for recreational purposes.

20-8: In order to reduce the spread of POC root disease, a risk analysis will be completed for all projects in watersheds containing POC. Disease control strategies identified from experience and research will be applied on a site- or drainage-specific basis to prevent or if the disease is present, reduce the spread and severity of the disease.

[Page IV-130] 20-9: Information concerning POC root disease, its spread and prevention, will be provided to the public.

20-10: Proactive disease prevention measures such as road closures, road maintenance, and sanitation removal of roadside POC will be undertaken to help prevent the spread of the disease, especially to high risk areas. Prevention measures would be identified at a site-specific or drainage-specific level through environmental analysis.

IMPLEMENTATION, MONITORING, EVALUATION, & AMENDMENT

Forest Pests & Diseases

[Page V-20] *Effectiveness monitoring questions:* Are applicable mitigations and management strategies preventing/minimizing significant damage or growth reductions from destructive insects or diseased on the Forest, including POC root disease?

Sampling methods and intensity: (1) Routine sampling during stand exams and reforestation surveys;

and (2) biannual aerial detection surveys, plus intensive sampling of road systems infected by POC root disease.

Threshold of concern and responsible staff: (1) Pathogen or pest levels indicate potential for damage or growth loss in 15 percent of samples; (2) detected acceleration of POC root disease spread; and (3) SO and District silviculturists.

APPENDIX H

Pests: Port-Orford-cedar:

[Page H-9] *Monitoring purposes:* (1) Determine infected locations, rates of spread and overall trends of POC root disease; and (2) evaluate effectiveness of strategies to control spread of the disease.

Threshold of concern/Variability: Measured acceleration or deceleration of spread as an indicator of positive or negative effectiveness of control strategies.

Data collection: Conduct aerial photographic inventories to identify healthy and diseased stands. Intensively sample infected road systems to determine the extent and rate of spread of POC root disease along transportation routes. Regularly schedules reforestation surveys after the first, third, and fifth growing seasons will indicate performance in plantations. Perform aerial detection surveys at least every two years to indicate spread along streams and roads and within forest stands. Research will be initiated to measure genetic diversity, develop disease-resistant trees, and evaluate methods of control.

Responsibility: Forest ecologist and Forest and District silviculturists.

APPENDIX K – PORT-ORFORD-CEDAR ACTION PLAN

[Page K-4] Control Strategy—Project analysis and Implementation

The following is an outline format to be used to complete a risk analysis for all projects in watersheds containing POC. Disease control strategies will be applied as appropriate on a site or drainage-specific basis to reduce the spread and severity of the disease.

		Risk (concern)		
	% of POC	Low	Moderate	High
IMPACT	Low (0–5)	Low	Low	High
	Moderate (5–20)	Low	High	High
	High (>20)	High	High	High

Defining Risk

Low—Below roads, no POC within 500 feet; above roads, no POC within 50 feet.

Moderate—Below roads, POC may be between 100 and 500 feet of the road; above road, no POC within 50 feet.

High—Below roads, POC within 100 feet; above roads, POC within 50 feet.

Potential Project Objectives

Objective A: Prevent the import of disease into uninfected areas (offsite spores picked up and carried into uninfected project area).

Objective B: Prevent the export of disease to uninfected areas (onsite spores moved to offsite uninfected area).

Objective C: Minimize increases in the level of inoculum or minimize the rate of spread in areas where the disease is endemic or infection is intermittent. If possible identify the probable mechanism of

spread; whether by introduction of spores or by root grafting.

Threshold of Concern Assessment

The assessment will discuss the level of concern regarding the project, the causes for concern, specific areas of concern and possible treatments to preclude the level of risk. The following is a list of possible treatments.

Disease Control Strategies

Engineering and Road Management [E]

E-1: Road locations should be made, when possible, below cedar areas or on opposite sides of ridges.

E-2: Control drainage from roads so that it is dispersed to the maximum extent feasible through outsloping and/or frequent ditch relief. Where not feasible, drainage should be concentrated into existing stream channels.

E-3: Locate and design waste areas so they do not spread infection spores.

E-4: Limit road construction to the dry season.

E-5: Machinery and vehicles working and traveling on road prior to establishment of final drainage need to be washed before entering project.

E-5A: Machinery and vehicles working and traveling on road prior to establishment of final drainage need to be washed before entering project. Trucks end-hauling material to waste areas may be exempted provided no infected toads or sites are traveled between the project and the waste area.

E-6: Wash equipment before leaving infected areas.

E-7: Close roads with guardrails, physical blockages or "putting to bed". Maintenance and enforcement is included.

E-7A: Close roads with guardrails, physical blockades or "putting to bed" in order to restrict product utilization and management activities in the dry season (June 1 through September 30). Maintenance and enforcement are included.

E-8: Avoid dust abatement with potentially infected water or treat water with chlorine.

E-8A: Avoid dust abatement and compaction with potentially infected water or treat water with chlorine.

E-9: Maintenance activities should avoid spilling rock on outside or downslope side of the road. As needed, blading shall be kept within 2 feet of the road edge to better achieve this.

E-10: Where conditions permit, inslope the road template and establish berm on the outside edge of the road to prevent downslope flow of contaminated water.

E-10A: For maintenance purposes, where conditions permit, establish berm on the outside edge of road to prevent downslope flow of contaminated water.

E-11: Establish road rules to prevent timber haul during periods when spores will be spread widely.

E-12: Dump fill and debris from infested culverts and ditches in safe areas to avoid spreading the fungus.

E-13: Establish road surface blading requirements to maintain a specified road template during maintenance operations.

Timber Harvest [T]

T-1: Limit the operating season of timber sale operations to the drier months.

T-1A: Limit the operating season of timber sale operations to the drier months (June 1 to September 30); discontinue operations during periods of rain or wet weather (C6.315: Limited Operating Season).

T-2: Wash logging equipment before operating away from landings and roads.

T-3: Constrain timber haul so trucks do not travel from infected areas, contaminating the latter. Harvest the units in priority order to minimize the spread of spores to uninfected areas.

T-4: When feasible, plan downhill logging to avoid road construction above uninfected stand.

T-5: Use helicopter logging to protect high value cedar stands.

T-6: Use service contracts to harvest timber with more control of activities.

T-7: Wash logging equipment working in infested sites before it is moved off site.

T-8: Wash logging equipment, other than log trucks, prior to entering sale area.

T-9: Wash log trucks and other equipment when moving from infected to uninfected areas during wet weather.

Stand Management [S]

S-1: Identify low risk areas and emphasize maintaining and/or introducing POC into the species mix.

S-2: Plant POC singly or in groups at a wide-spacing independent of other stocking.

S-3: Avoid planting POC within 50 feet of roads, streams, or wet areas.

S-4: During precommercial thinning [PCT] thin POC at a 25 foot spacing, independent of other crop trees, or space POC in groups 100 feet apart were possible.

S-5: As part of PCT, remove POC from areas adjacent to roads, streams, and other high risk areas.

S-6: To insure the presence of POC through the rotation, leave all thrift cedar during commercial thinning.

S-7: Manage the cedar component of the stand on a longer rotation than the other associated conifers. Example: carry cedar through two or three fir rotations.

S-8: Plant container grown POC until bare root stock can be certified disease free at the nursery.

S-9: Indicate in stand records (TRI, etc.) that POC protection measures have been implemented.

S-10: Minimize management entries during wet meadow. Wash vehicles when such entries are made. Must be associated with formal road closure.

S-11: Where possible coordinate prevention/control activities with adjacent private landowners.

Other [O]

O-1: Administrative closure orders.

O-2: Coordinate other products utilizations with POC control needs and road closures. Examples: fuelwood cutting, cedar bough cutting.

POC Cumulative Effects Analysis

[Page K-7] Each project analysis will contain a discussion of potential cumulative effects. The assessment will use the following definitions and will use the analysis chart to help determine whether there are potential secondary or cumulative effects.

Definitions

Meaningful quantities of POC: Use 5 percent or greater cover. Consider and identify exceptional situations where less than 5 percent can be meaningful, such as small isolated stands near the edge of the species range.

Downslope/downstream: Consider all the forest land areas between the analysis area and the first occurrence of the root disease. If a proposed activity occurs on a ridgetop then analyze both drainages.

Introducing risk: Estimate the percent of the analysis area in which the risk of infection is increased as a result of the proposed management activity.

Meaningful levels of mortality: This is defined as a mortality rate of 25 percent of existing POC over the next 20 year period.

Cumulative Effects Analysis Chart

Meaningful quantities of POC within or downslope/downstream of the analysis area?	*If no, then no secondary or cumulative effect.*
If yes, continue.	
Will the proposed project introduce risk to this cedar?	*If no, then no secondary or cumulative effect.*
If yes, continue.	
Following mitigation, is disease likely to infect a major amount of the analysis area?[1] [Ref: 40 CFR 1508.27]	*If no, then no secondary or cumulative effect.*
If yes, then there are potential secondary and cumulative effects.	

[1] Major is a relative term; it means great or large in relative importance to POC existence in the near proximity and over its range, notable or conspicuous in effect or scope (for instance, visually detracting), or poses a serious risk to the ecosystem, its neighbor POC, and the total population.

Existing Direction — Klamath National Forest

The following is from the "Klamath National Forest Land and Resource Management Plan" (1995).

Desired Future Condition of the Forest

The Forest in 10 Years

[Page 4-16] Management activities would be promoted than increase the populations of desirable plant species with limited distributions or low population levels. Species of concern include Brewer spruce, POC, Pacific yew, and sugar pine.

Standards and Guidelines

Biological Diversity

[Page 4-23] 6-13: Management activities should be designed to maintain or increase population levels of desirable native plant species that currently have low population levels, of desirable plant species with limited habitat distribution and of desirable plant species that have problems with disease. Examples include POC, sugar pine, Pacific yew, Brewer spruce, etc.

[Page 4-24] 6-15: All vegetative management practices should be designed to maintain a healthy forest. Conditions that promote the introduction and spread of disease, increase the risk of insect attack or promote unacceptable fire risk should be avoided.

Transportation and Facilities Management

[Page 4-51] 20-1: Transportation Planning analysis should: (4) Evaluate the risk of spread of POC root disease through road upgrades, seasonal closures, permanent closures, maintenance and decommissioning or obliteration.

Timber Management

[Page 4-59] 21-57: Maintain a healthy and resilient population of all species, including special interest species such as Pacific yew, brewer spruce, POC, Pacific silver fir, Baker cypress, and whitebark pine throughout their native range.

1. Projects with the potential to impact special interest species should be analyzed and the potential impacts documented through the EA process.

2. Mitigation for impacts should include provisions for planting or increasing local populations where desirable.

[Page 4-60] 21-61: Take measures that shall limit the spread of POC root rot, and increase populations of POC on the Forest. Prevent or reduce the risk of introducing the disease into uninfested areas. Strategies for reducing the risk to POC from infection by the root disease will be integrated into all levels of planning (NEPA documents, ecosystem analysis, LSR assessments, WSR management plans, transportation plans, recreation and other activities or strategies).

In order to reduce the spread of POC root disease, a risk analysis will be completed for all projects in watersheds containing POC. Disease control strategies identified from experience and research will be applied on a site or drainage-specific basis to reduce the spread and severity of the disease.

Existing Direction — Shasta-Trinity National Forest

The following is from the "Shasta-Trinity National Forests Land and Resource Management Plan" (1995).

CHAPTER 4, STANDARDS AND GUIDELINES

[Page 4-18] 10. Forest Pests

a. When conducting watershed/ecosystem analysis, consider the possible effects that Forest pests may have on management objectives and desired future conditions.

b. Implement an integrated pest management (IPM) program to maintain or reduce forest pest impacts to acceptable levels and to maintain or enhance forest health and vigor. Any decision to use pesticides will require site specific environmental analysis.

e. Take measures that limit the spread of POC root disease.

SUPPLEMENTAL MANAGEMENT AREA (MA) DIRECTION

[Page 4-102] MA 5 - Parks-Eddy: (16) Perform a POC risk analysis for any planned management activities in areas with that species. Implement appropriate mitigation measures to prevent the introduction of *Phytophthora lateralis* the cause of POC root disease.

[Page 4-105] MA 6 - Upper Trinity: (4) Perform a POC risk analysis for any planned management activities in areas with that species. Implement appropriate mitigation measures to prevent the introduction of *Phytophthora lateralis* the cause of POC root disease.

[Page 4-109] MA 7 - Weaverville/Lewiston: (3) Perform a POC risk analysis for any planned management activities in areas with that species. Implement appropriate mitigation measures to prevent the introduction of *Phytophthora lateralis* the cause of POC root disease.

[Page 4-115] MA 8 - Trinity Unit: (5) Perform a POC risk analysis for any planned management activities in areas with that species. Implement appropriate mitigation measures to prevent the introduction of *Phytophthora lateralis* the cause of POC root disease.

[Page 5-9] TABLE 5-1: MONITORING ACTION PLAN

Forest Pests

Activity, Practice or Effect: Forest pest activity levels (especially where they conflict with management objectives)

Techniques and/or Data Sources: Review project level plans for inclusion of possible pest effects

Intensity and Standard: Regional standards; selected project plans

Frequency of Measurement/Reporting: Annually, as changes occur

Expected Precision/Reliability: High

Variability in Standard Which Would Require Further Evaluation and/or Corrective Action: > 10 percent of project plans fail to consider pests

APPENDIX L, DESCRIPTION OF MANAGEMENT PRACTICES

[Page L-3] Integrated Pest Management

The decision-making process considers the ecology of the host and its pests throughout the rotation of the forests. It also considers management objectives and economic values of the resource, couples with monitoring data on pest populations and environmental factors that favor their increase. These data are required to decide for or against action to reduce excessive losses to the resource.

Action alternatives may be oriented toward prevention of losses or they may be in directs response to chronic or catastrophic losses. One or more approaches may be used. These approaches emphasize retention of natural system and include cultural, mechanical, biological, regulatory, and chemical tactics. A no-action alternative may also be appropriate.

Existing Direction — Siuslaw National Forest

The following is from the "Siuslaw National Forest Land and Resource Management Plan" (1990).

FOREST-WIDE STANDARDS AND GUIDELINES

[Page IV-58] FW-179: Pest Management - Use an Integrated Pest Management (IPM) approach, which

recognizes pest management as an integral part of timber and other resource management, to prevent and reduce unacceptable pest-related damage. Under IPM, consider and analyze a full range of pest management alternatives, including cultural, biological, chemical, and mechanical methods, on a site-specific, project-level basis. Select specific treatment methods through an environmental analysis process which will consider environmental effects, treatment efficacy, and cost of each alternative on a case-by-case basis. Set up monitoring and enforcement plans to implement specific measures during this site- and project-specific analysis.

OREGON DUNES NATIONAL RECREATION AREA (NRA) MANAGEMENT PLAN, *Amendment to the Siuslaw Forest Plan (1994).*

Management of Habitats

[Page III-10] Plants – Management of plant habitats will be focused on globally significant communities included in Management Area [MA] 10(F), plants that are listed as sensitive, and native plant communities associated with the active-dune ecosystem. Management in globally significant communities will focus primarily on maintenance and protection and development of plant-based learning opportunities. Globally significant communities currently within MA 10(F) include:

Port Orford cedar/evergreen huckleberry community.

[Page III-42] Management Area 10(F) – Plant, Fish and Wildlife Habitats

Goals – To maintain, create, enhance or restore a variety of special plant, fish and wildlife habitats.

Desired Condition – Optimum physical and biological conditions necessary for target plant, fish or wildlife communities are present. Diverse habitats of various sizes are dispersed across the Oregon Dunes NRA. Even though management activities have taken place, the area is predominantly natural appearing. Human use and disturbance is low. There is an absence of ORVs (other than for administrative uses) and incompatible behaviors such as disturbing animals or harvesting plants. There are few trails or other facilities.

Following are descriptions of the desired condition for the specific components of this management area:

Forest Habitats – Forest stands have multiple vegetation layers except in communities where this would not naturally occur. Where present, the shrub layer is relatively undisturbed. Different plant communities and tree age groups are spread throughout the management area. Snags and down logs are present in numbers expected to occur naturally. There is an abundance of mushrooms and other decomposers.

Appendix 4: Clorox Use, Toxicity, Potential Environmental Effects, and Label Information

Introduction and Use

Ultra Clorox® Brand Regular Bleach (EPA Reg. No. 5813-50) is registered for POC root disease treatment use. The active ingredient in Ultra Clorox® is sodium hypochlorite. When used as directed, it is effective in killing PL in treated water. As described in other sections of this SEIS and suggested in the standards and guidelines of some of the alternatives, treating water prior to use helps control the spread of PL to uninfested areas. Water is commonly drafted from streams and fire ponds within forested areas to use in dust abatement on forest roads, equipment cleaning, and for fire suppression.

Label instructions (see Appendix 4) specify 1 gallon of Ultra Clorox to 1,000 gallons (~50 parts per million available chlorine) of drafted water. Prepare the mixture at least 5 minutes prior to application for dust abatement, fire suppression, and cleaning trucks, logging, road-building, and maintenance equipment.

This label has been in effect since March 5, 2001. The Biscuit Fire on the Siskiyou NF in 2002 burned 500,000 acres including 95,000 acres of POC. Suppression activities lasted over 4 months and restoration activities followed. Approximately 9,900 gallons of Ultra Clorox were used in accordance with the label to treat water used on the fire and to clean suppression equipment. Such uses would be projected to continue under the current direction.

Vehicle and other washing stations are always located where direct runoff will not enter streams. Water spread on roads or dropped onto fires develops into a fine to moderate spray in the air, and spreads on contact. Sodium hypochlorite is a strong oxidizing agent and quickly breaks down on contact with organic matter. Decomposition takes place within seconds in the presence of ammonium salts (National Fire Protection Association 1986).

Toxicity and Potential Environmental Effects

In 1986, based upon available data on Clorox's chemistry, toxicity, environmental fate, and ecological effects, the U.S. Environmental Protection Agency (EPA) concluded that any hazards associated its uses were relatively small (Chemical Fact Sheet 1986). Toxicity characteristics of Clorox were identified as follows:

Mallard duck	5,220 parts per million
Quail	5,620 parts per million
Rainbow trout	0.18 – 0.22 milligrams/liter
Daphnia	0.033 – 0.048 milligrams/liter

In 1991, the EPA determined that human risks from chronic and subchronic exposure to low levels of Clorox were minimal and without consequence to human health. Upon reevaluating the 1986 data, they also reaffirmed that currently registered uses of Clorox would not result in unreasonable adverse effects to the environment. The EPA also stated they believed that the risk of acute exposure to aquatic organisms was sufficiently mitigated by, in part, its precautionary labeling (EPA 1991).

Sodium hypochlorite is highly toxic to aquatic organisms. The freshwater criteria for the protection of most aquatic species and their uses are 11 micro g/L TRC [total residual chlorine] as a 4-day average (0.011 parts per million) and 19 micro g/L as a 1-hour average (EPA 1984). Research into the control of zebra mussels (*Dreissena polymorpha*) showed it was an effective biocide at concentrations of 1 mg/L (1 parts per million) (Martin et al. 1993). Rainbow trout (*Salmo gairdneri*) exposed to a 30-minute dose showed an LC50 value of 0.43 mg/L at 20 C (0.43 parts per million) while triple exposures for 5 minutes resulted in a LC50 of 1.65 mg/L (Brooks and Seegert 1977).

Non-human mammalian toxicity values are LD50 Rat oral 8.91 g/kg (Department of Transportation-U.S. Coast Guard 1984) and LD50 Mouse oral 5,800 mg/kg (Lewis 1996). There is inadequate evidence for the carcinogenicity of hypochlorite salts (IARC 1991).

Alternatives 1, 2, and 3

Use will continue at approximately existing rates, although 2002 was an unusually heavy fire year in the range of POC. Average annual fire use should be no more than 1,000 to 2,000 gallons, with other uses less than that.

Use of Ultra Clorox® for water decontamination will not result in aquatic exposure if it is applied in accordance with label instructions. When used in water dropped from helicopters, dropping directly into visible water sources is avoided. Drops into smaller wet areas may happen, but water drops are generally only made directly on actively burning spots, so localized effects of dropping treated water is expected to be outweighed by the benefits of reducing the fire intensity. Water errantly dropped on somewhat larger streams may take yards or tens of yards to dilute to sub-toxicity levels, but again these drops occur in areas in the process of being burned.

Ultra Clorox® can cause severe but temporary eye irritation and can be a skin irritant (U.S. Coast Guard, Department of Transportation 1984). Use of the appropriate personnal protective equipment by those preparing the Ultra Clorox® treated water will avoid accidental exposure from splash to eyes or skin.

Alternatives 4 and 5

There are no POC management measures applied under these alternatives that would use Clorox.

Clorox Label Information

The following information copied verbatim from the Clorox label is pertinent to Port-Orford-cedar root disease control.

ULTRA CLOROX ® BRAND REGULAR BLEACH (EPA Reg. No. 5813-50)
FOR PORT ORFORD CEDAR ROOT DISEASE (*Phytophthora lateralis*) TREATMENT USE

When used as directed, this product is effective in controlling the spread of the fatal fungus *Phytophthora lateralis* [Port Orford Cedar Roost Disease] in areas of California and Oregon where Port Orford Cedar (*Chamaecyparis lawsoniana*) grows.

Water is commonly drafted from streams and fire ponds within forested areas to use in dust abatement on forest roads, equipment cleaning, and for fire suppression. The water source can spread the root disease fungus to uninfested areas. Treating water prior to use helps control the spread of the fungus.

Directions for Use: Add 1 gallon this product to 1000 gallons (~50 parts per million available chlorine) of drafted water. Prepare the mixture at least 5 minutes prior to application for dust abatement; fire suppression; and cleaning trucks, and logging, road building, and maintenance equipment.

DILUTION TABLE

Approximate available Chlorine	Volume of Bleach	Volume of Water
50	16 drops	1 quart
	¾ tsp.	1 gallon
	1 Tbsp. (1/2 oz)	4 ½ gallons
	2 ½ Tbsp.	10 gallons

PRECAUTIONARY STATEMENTS: HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER: CORROSIVE
May cause severe irritation or damage to eyes and skin. Harmful if swallowed. Protect eyes when handling. For prolonged use, wear gloves. Wash after contact with product. Avoid breathing vapors and use only in a well-ventilated area.

FIRST AID IF IN EYES: Rinse with plenty of water for 15 minutes. Get prompt medical attention. **IF SWALLOWED**: Drink large amounts of water. DO NOT induce vomiting. Call a physician or poison control center immediately. **IF IN CONTACT WITH SKIN**: wash skin thoroughly with water.

PHYSICAL OR CHEMICAL HAZARDS: Product contains a strong oxidizer. Always flush drains before and after use. **Do not use or mix with other household chemicals**, such as toilet bowl cleaners, rust removers, acids, or products containing ammonia. To do so will release hazardous irritating gases. Prolonged contact with metal may cause pitting or discoloration.

For Institutional use only:
ENVIRONMENTAL HAZARDS: Do not discharge effluent containing this product into lakes, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge System (NPDES) permit and the permitting authority has been notified in writing prior to discharge.

STORAGE AND DISPOSAL: Store this product upright in a cool, dry area, away from direct sunlight and heat to avoid deterioration. In case of spill, flood areas with large quantities of water. Small quantities of spilled or unusable product should be diluted with water before disposal in a sanitary sewer. Do not reuse empty container, but rinse and place in trash or recycle where facilities accept colored HDPE bottles. Do not contaminate water, food, or feed by storage, disposal or use of this product. **Store away from children. Reclose cap tightly after each use.** Offer empty container for recycling. If recycling is not available, discard container in trash. DO NOT allow product [and/or rinsate] to enter storm drains, lakes, streams, or other bodies of water.

CLOROX CUSTOMER ASSISTANCE (800) 292-2200

Appendix 5: Monitoring Plans for Each Alternative

Alternative 1

Alternative 1 is covered by existing land and resource management plan monitoring plans.

Alternatives 2–5

To maintain POC as an ecologically and economically significant species on BLM- and NF-administered lands, management strategies (both actions and inactions) will be evaluated.

Implementation Monitoring — *Questions*

1) Have resistance breeding and genetic conservation requirements been met?

2) Are general requirements for maintaining and reducing the risk of PL infections being implemented? *Note:* For Alternative 2, these are listed under General Direction.

3) Are project-specific management actions applied as required?

Implementation Monitoring — *Requirements*

1) The "Dorena Port-Orford-Cedar Interagency Agreement" will address current accomplishments including levels of established conservation seedbanks in its annual report.

2) The BLM Coos Bay, Medford, and Roseburg Districts will report in their annual program summaries, and the Siskiyou NF in its annual monitoring and evaluation report, the general activities accomplished for maintaining and reducing the risk of PL infections.

3) Administrative units will incorporate POC management actions into their existing project-specific implementation monitoring programs.

Effectiveness and Validation Monitoring — *Questions*

1) Is the genetic resistance program producing POC seedlings that survive long term under field conditions?

2) Are disease-controlling mitigation measures such as road use restrictions and closures, sanitation, and washing, effective as predicted, and is the risk associated with projects such as fire suppression at presumed or predicted levels?

3) Has the spread or non-spread of the disease significantly departed from the predictions made in this SEIS that were used to select a management strategy?

4) [Under Alternative 3 only] Is the disease being kept out of the 32 uninfested 6th field watersheds and if not, have appropriate eradication treatments been tried and are they successful?

Effectiveness and Validation Monitoring — *Requirements*

1) The "Dorena Port-Orford-Cedar Interagency Agreement" will report annually survival results of validation studies that determine effectiveness of the genetic resistance program.

2) The USDA-FS Southwest Oregon Forest Insect and Disease Service Center will continue to evaluate and coordinate existing management techniques to reduce the occurrence of PL and retain healthy POC. Emphasis will be directed towards ongoing projects and monitoring their results. Actual monitoring will be split between the Service Center and the administrative units where management occurs. Additional (new) monitoring efforts will be a function of available budget and workforce. In some cases, university research will be the appropriate vehicle to accomplish evaluations of management techniques.

3) As new inventory data (continuous vegetation survey and forest inventory and analysis) and local mapping becomes available, it will be evaluated for current levels (acres and/or number of trees) of infected and uninfected POC and corresponding trends. Inventory plots are typically re-inventoried on a 3- to 10-year cycle, depending upon location.

4) [Alternative 3 only] Road, aerial, or photo surveys of the uninfested watersheds will be done to identify new infestations at least once every 2 years.

Appendix 6: Port-Orford-Cedar Seed and Seedling Deployment Strategy

Note: This Strategy applies to Alternatives 2, 3, and 4.

Each Federal administrative unit within the natural range of POC would prepare a POC deployment strategy by the beginning of Fiscal Year 2006. Standards and guidelines, developed by each respective Federal agency, are to be coordinated with adjacent Agencies to coordinate common deployment efforts. Resistant seed for several breeding zones became available in the fall of 2002. The potential availability of surplus Federal POC seed or seedlings for use by state and private landowners should also be considered.

The deployment strategy should specifically address:

1) The creation and maintenance of a POC conservation seedbank at the administrative unit level, reserved for supporting overall reforestation efforts after a catastrophic event as described in the Genetics section of this alternative;

2) the creation and maintenance of an operational POC seedbank to be used for fulfilling routine silvicultural seed needs;

3) determination of the most appropriate mix of resistant and non-resistant POC stock, along with determining species ratios (especially where species such as western red cedar and incense cedar may share similar structural attributes and can help address functionality of riparian ecosystems) to be planted on a given type of site;

4) prioritize the planting of POC seedlings on a project basis (including replacement of POC killed by PL to desired stand densities by favoring the use of resistant stock, and reintroducing POC to small areas of its natural range where it has been eliminated);

5) determining the appropriate use of planting POC stock in respect to different harvest cuts (including underplanting);

6) insuring that spacing requirements, as defined in Management Practice 10, are considered on a project basis; and

7) integrating the use of resistant stock with other management techniques such as prescribed fire.

Resistant stock will be used in a manner which does not compromise the health of natural stands. In addition, deployment and priority for use will be established in order to use the stock in the most efficient manner. Resistant stock will be planted, on a hierarchy basis, as follows:

- Within the natural range of POC;
- where POC has been severely reduced from mortality caused by PL on a micro-

watershed scale, and where ecosystem function has been or could be adversely impacted in the future;

- compatible with, and compliments existing land-use allocation objectives;

- avoiding planting areas where there is a high probability of infection if there also exists a high probability that this infection can spread to uninfected POC within, near, or downstream of the site; and

- planting favorable microsites for survival (for example, convex slopes in the upper portions of riparian areas).

Appendix 7: Biological Evaluations

Wildlife

Threatened and Endangered Species

Implementation of any of these alternatives would result in a may affect, not likely to adversely affect on the northern spotted owl and a may affect on the critical habitats of the northern spotted owl and marbled murrelet.

Northern Spotted Owl (*Strix occidentalis caurina*)

Management of the northern spotted owl and its habitat on federally-managed lands was an important consideration in the design of the Northwest Forest Plan. This species received extensive attention in the Northwest Forest Plan final SEIS and its supporting documents.

Environmental Consequences: All requirements of the land management plans/resource management plans and ESA would be fulfilled prior to implementation of specific projects.

Alternatives 1 and 2. These alternatives do not prescribe any loss of suitable nesting, roosting, foraging, or dispersal habitat. POC, potentially even suitable nest trees, would be removed as a component of roadside sanitation efforts. Within areas subjected to sanitation there are potentially up to 9 acres (75 feet x 5,280 feet) of habitat per mile of road; within upland habitats in the righ-risk portion of its range, POC may comprise up to 40 percent of the total overstory cover (see Table 3&4-13). The ability of the adjacent stands to function for the northern spotted owl would not be changed. Road closures and seasonal use restrictions would reduce disturbance associated with road use and adjacent nesting habitat, benefiting northern spotted owls. Many of the roads to be closed or seasonally restricted are low use roads, so benefits may be relatively small. All provisions provided for the northern spotted owl in current resource management plans/land management plans would be implemented.

About 74 percent of the Federal landscape within the analysis area is within reserves other than riparian. The remaining 26 percent is Matrix/Riparian Reserve. The Northwest Forest Plan projected that less than 4 percent of the remaining late-successional forest would be harvested per decade. Actual harvest has been well below that rate. Based on the harvest rate in the last 8 years, late-successional forests have been harvested at less than 2.5 percent for the first decade. The reduced rate of harvest is due primarily to greater than expected riparian reserve coverage, the effects of Survey and Manage mitigation measures, and legal challenges. Harvest of late-successional forests under both alternatives would not exceed the rate anticipated in the Northwest Forest Plan final SEIS.

Implementation of Alternatives 1 and 2 in 100 years would result in approximately 17 percent of POC not currently infected with PL in the North Coast Risk Region, 20 percent in the Siskiyou Risk Region, and 28 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands on 271,367 acres in Oregon, 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent) where it often constitutes up to 35 to 40 percent of the overstory cover.

Alternative 3. This alternative creates a system of POC buffers and cores within 32 6th field watersheds that are currently uninfested with PL (505,329 acres; 33 percent of the analysis area). Timber harvests would be eliminated on 28,086 acres in the POC cores; this restriction does not preclude salvage options in the case of a stand-replacing event. Timber harvests and other activities would be restricted on 2,600 acres of Matrix lands. Additionally, all POC less than 10 inches dbh (diameter at breast height) would be removed along all roads within the POC cores. There are approximately 9 acres per mile of road. The loss of these smaller diameter trees would not affect the adjacent stands' functionality. Road closures and seasonal use restrictions would reduce disturbance associated with road use and adjacent nesting habitat and benefit northern spotted owls. Many of the roads to be closed or seasonally restricted are low use roads, so benefits may be relatively small. Within POC buffer areas future infestation of PL would be eradicated. Areas outside of the POC buffers and cores would be managed similar to Alternatives 1 and 2.

About 74 percent of the Federal landscape within the analysis area is within reserves other than riparian. The remaining 26 percent is Matrix/Riparian Reserve. The Northwest Forest Plan projected that less than 4 percent of the remaining late-successional forest would be harvested per decade. Actual harvest has been well below that rate. Based on the harvest rate in the last 8 years, late-successional forests have been harvested at less than 2.5 percent for the first decade. The reduced rate of harvest is due primarily to greater than expected Riparian Reserve coverage, the effects of Survey and Manage mitigation measures, and legal challenges. Harvest of late-successional forest under both alternatives would not exceed the rate anticipated in the Northwest Forest Plan final SEIS.

Implementation of Alternative 3 in 100 years would still result in approximately 16 percent of POC not currently infected with PL in the North Coast Risk Region, 15 percent in the Siskiyou Risk Region, and 19 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands on 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover.

Alternatives 4 and 5. These alternatives allow for the progression of PL across the landscape. There are no active management actions planned that would cause the direct loss or modification of suitable nesting, roosting, foraging, or dispersal habitat. PL resistant stocks of POC would be used to restore POC to the landscape.

Implementation of Alternatives 4 and 5 in 100 years would still allow approximately 19 percent of POC not currently infected with PL in the North Coast Risk Region, 34 percent in the Siskiyou Risk Region, and 50 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands over 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover. Similar effects may occur in other plant associations on granitic or diorite soils.

These alternatives could result in the modification of occupied or potentially occupied spotted owl habitat due loss of, or, impacts to suitable nesting, roosting, or foraging habitat. None of the alternatives should modify or remove sufficient nesting, roosting, or foraging

habitat from any one stand to cause or degrade in habitat classification; either from nesting to dispersal or dispersal to non-habitat. Project specific analysis/consultation will be conducted to mitigate site specific impacts, where capable, and meet the intents of the National Environmental Policy Act, the Endangered Species Act, and planning regulations. Therefore, these alternatives may affect, but are not likely to adversely affect the northern spotted owl.

These alternatives could result in the modification of spotted owl critical habitat by causing the removal of individual, large-diameter trees capable of providing nesting substrate and the modification of suitable nesting, roosting, foraging habitat and dispersal habitats. None of the alternatives should modify or remove sufficient nesting, roosting, or foraging habitat from any one stand to cause degradation in habitat classification; either from nesting to dispersal or dispersal to non-habitat. Project specific analysis/consultation will be conducted to mitigate site specific impacts, where capable, and meet the intents of the National Environmental Policy Act, the Endangered Species Act, and planning regulations. Therefore, these alternatives may affect northern spotted owl critical habitat.

Marbled Murrelet (*Brachyramphus marmorata*)

The management strategy for marbled murrelets in the Northwest Forest Plan includes two primary components: (1) protection and development of marbled murrelet nesting habitat inside the large reserves near the coast; and (2) retention of all current and future known marbled murrelet nest sites in all land allocations and protecting occupied habitat. POC contributes to the overall ability of the surrounding stand to function as marbled murrelet nesting habitat, but serves as an inferior nesting platform because of its limb structure.

Environmental Consequences: Under all alternatives the level of protection for currently occupied marbled murrelet habitat would not be changed; all habitat disturbing activities would have pre-project surveys accomplished and known and future nest sites would be protected. All requirements of the land management plans/resource management plans and ESA would be fulfilled prior to implementation of specific projects.

Alternatives 1 and 2. Alternatives 1 and 2 do not prescribe any loss of suitable nesting habitat. POC, potentially even suitable nest trees, would be removed as a component of roadside sanitation efforts. Within areas subjected to sanitation there are potentially up to 9 acres (75 feet x 5,280 feet) of habitat per mile of road; within upland habitats in the high-risk portion of its range POC may comprise up to 40 percent of the total overstory cover. The ability of the adjacent stands to function for the marbled murrelet would not be changed. Road closures and seasonal use restriction would reduce disturbance associated with road use and adjacent nesting habitat and benefit marbled murrelets. Many of the roads to be closed or seasonally restricted are low use roads, so benefits may be relatively small. All provisions provided for the marbled murrelet in current resource management plans/land management plans would be implemented.

About 74 percent of the Federal landscape within the analysis area is within reserves other than riparian. The remaining 26 percent is Matrix/Riparian Reserve. The Northwest Forest Plan projected that less than 4 percent of the remaining late-successional forest would be harvested per decade. Actual harvest has been well below that rate. Based on the harvest rate in the last 8 years, late-successional forests have been harvested at less than 2.5 percent

for the first decade. The reduced rate of harvest is due primarily to greater than expected riparian reserve coverage, the effects of Survey and Manage mitigation measures, and legal challenges. Harvest of late-successional forest under both alternatives would not exceed the rate anticipated in the Northwest Forest Plan final SEIS.

Implementation of Alternatives 1 and 2 in 100 years would still result in approximately 17 percent of POC not currently infected with PL in the North Coast Risk Region, 20 percent in the Siskiyou Risk Region, and 28 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands on 271,367 acres in Oregon; 17.6 percent of the federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover.

Alternative 3. Alternative 3 creates a system of POC buffers and cores within 23 6th field watersheds that are currently uninfested with PL (505,329 acres; 33 percent of the planning area). Timber harvests would be eliminated on 28,086 acres in the POC cores; this restriction does not preclude salvage options in case of a stand-replacing event. Timber harvests and other activities would be restricted on 2,600 acres of Matrix lands. Additionally, all POC less than 10 inches dbh (diameter at breast height) would be removed along all roads within the cores. There are approximately 9 acres per mile of road. The loss of these smaller diameter trees would not affect the adjacent stands' functionality. Road closures and seasonal use restriction would reduce disturbance associated with road use and adjacent nesting habitat and benefit marbled murrelet. Many of the roads to be closed or seasonally restricted are low use roads so benefits may be relatively small. Within POC buffer areas future infestation of PL would be eradicated. Areas outside of the POC buffers and cores would be managed similar to Alternatives 1 and 2.

About 74 percent of the Federal landscape within the analysis area are in reserves other than riparian. The remaining 26 percent is Matrix/Riparian Reserve. The Northwest Forest Plan projected that less than 4 percent of the remaining late-successional forest would be harvested per decade. Actual harvest has been well below that rate. Based on the harvest rate in the last 8 years, late-successional forests have been harvested at less than 2.5 percent for the first decade. The reduced rate of harvest is due primarily to greater than expected riparian reserve coverage, the effects of Survey and Manage mitigation measures, and legal challenges. Harvest of late-successional forests under both alternatives would not exceed the rate anticipated in the Northwest Forest Plan final SEIS.

Implementation of Alternative 3 in 100 years would still result in approximately 16 percent of POC not currently infected with PL in the North Coast Risk Region, 15 percent in the Siskiyou Risk Region, and 19 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands over 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover. Similar effects may occur in other plant associations on granitic or diorite soils.

Alternatives 4 and 5. Alternatives 4 and 5 allow for the natural progression of PL across the landscape. There are no active management actions planned that would cause the direct loss or modification of suitable nesting habitat. PL resistant stocks of POC would be used to restore POC to the landscape.

Implementation of Alternatives 4 and 5 would still allow approximately 19 percent of POC not currently infected with PL in the North Coast Risk Region, 34 percent in the Siskiyou Risk Region, and 50 percent in the Inland Risk Region to become infected with PL. POC is currently a component of stands on 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover.

Northwest Forest Plan requirements to survey suitable marbled murrelet habitat prior to implementing any habitat disturbing activities will not be modified by this plan. Project specific analysis/consultation will be conducted to mitigate site specific impacts, where capable, and meet the intents of the National Environmental Policy Act, the Endangered Species Act, and planning regulations. Therefore, these alternatives have no affect to the marbled murrelet.

These alternatives could result in the modification of potential nesting habitat by causing the removal of individual, large-diameter trees capable of providing nesting substrate and/or the modification of within 0.5 miles of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height. None of the alternatives should modify or remove sufficient nesting, roosting, or foraging habitat from any one stand to cause degradation in habitat classification from nesting to non-habitat. Project specific analysis/consultation will be conducted to mitigate site specific impacts, where capable, and meet the intents of the National Environmental Policy Act, the Endangered Species Act, and planning regulations. Therefore, these alternatives may affect marbled murrelet critical habitat.

Bald Eagle (*Halieatus leucocephalus*)

The Agencies survey extensively for bald eagles. Management of the bald eagle includes preparation of site-specific management plans and providing protection zones and management areas, as needed, to the species and its habitat. All requirements of the land management plans/resource management plans and ESA would be fulfilled prior to implementation of specific projects.

Environmental Consequences:

Alternatives 1 and 2. There is the small potential for the loss of suitable nest trees as a component of roadside sanitation. POC, potentially even suitable nest trees, would be removed as a component of roadside sanitation efforts. Within areas subjected to sanitation there are potentially up to 9 acres (75 feet x 5,280 feet) of habitat per mile of road; within upland habitats in the high-risk portion of its range POC may comprise up to 40 percent of the total overstory cover. Road closures and seasonal use restrictions would reduce disturbance associated with road use and adjacent nesting habitat and benefit the bald eagle. Many of the roads to be closed or seasonally restricted are low use roads so benefits may be relatively small.

Implementation of Alternatives 1 and 2 in 100 years would still allow approximately 17 percent of POC not currently infected with PL in the North Coast Risk Region, 20 percent in the Siskiyou Risk Region, and 28 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands over 271,963 acres in Oregon;

17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover.

Alternative 3. This alternative creates a system of POC buffers and cores within 23 6th field watersheds that are currently uninfested with PL (505,829 acres; 33 percent of the analysis area). Timber harvests would be eliminated on 28,086 acres in the POC cores; this restriction does not preclude salvage options in case of a stand-replacing event. Timber harvests and other activities would be restricted on 2,600 acres of Matrix lands. Additionally, all POC less than 10 inches dbh (diameter at breast height) would be removed along all roads within the POC cores. There are potentially 9 acres per mile of road. The loss of these smaller diameter trees would not affect suitable nesting habitat. Road closures and seasonal use restrictions would reduce disturbance associated with road use and adjacent nesting habitat. Many of the roads to be closed or seasonally restricted are low use roads, so benefits may be relatively small. Within POC buffer areas future infestation of PL would be eradicated.

Areas outside of the POC buffers and cores would be managed similar to Alternatives 1 and 2.

Implementation of Alternative 3 would still result in approximately 16 percent of POC not currently infected with PL in the North Coast Risk Region, 15 percent in the Siskiyou Risk Region, and 19 percent in the Inland Risk Region to become infected with PL. POC is currently a component of stands on 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover.

Alternatives 4 and 5. These alternatives allow for the progression of PL across the landscape. There is no active management planned that would cause the direct loss or modification of suitable nesting habitat. PL resistant stocks of POC would be used to restore POC to the landscape.

Implementation of Alternatives 4 and 5 in 100 years would still result in approximately 19 percent of POC not currently infected with PL in the North Coast Risk Region, 34 percent in the Siskiyou Risk Region, and 50 percent in the Inland Siskiyou Risk Region to become infected with PL. POC is currently a component of stands over 271,963 acres in Oregon; 17.6 percent of the Federal land base. Impacts to POC loss is expected to be most severe in ultramafic plant associations (11 percent), where it constitutes up to 35 to 40 percent of the overstory cover. Similar effects may occur in other plant associations on granitic or diorite soils.

These alternatives could result in the removal of individual, large-diameter trees that are capable of providing nesting structure of the bald eagle. Pre-project surveys, or prior monitoring efforts in the areas would indicate whether there are potential effects to the bald eagle. Project specific analysis/consultation will be conducted to mitigate site specific impacts, where capable, and meet the intents of the National Environmental Policy Act, the Endangered Species Act, and planning regulations. Therefore, these alternatives have no affect to the bald eagle.

Vernal pool fairy shrimp (*Branchinecta lynchi*)

This species does not require POC or forested habitats for critical components of its life history.

These alternatives will have no effect upon the habitat components of this species. Therefore, these alternatives have no affect to the vernal pool fairy shrimp.

Columbian white-tailed deer (*Odocoileus virginianus leucurus)*

The Columbian white-tailed deer is currently proposed for delisting within Douglas County, Oregon. The natural range of POC borders a portion of the known range of the Columbian white-tailed deer (Douglas County population) and any changes in amount of POC in those areas would have no effect upon the habitat to continue in its current capacity.

These alternatives will have no effect upon the habitat components of this species. Therefore, these alternatives have no affect to the Columbian white-tailed deer.

BLM Special Status Species

The BLM Special Status Species policy is applied to actions requiring authorization or approval by the Bureau to insure they are consistent with conservation needs of these species and do not contribute to the need to list them under the provisions of the ESA.

BLM special status species are as follows: Federal endangered, threatened, proposed and candidate species; State endangered and threatened species; Bureau Sensitive; Bureau Assessment; and Bureau Tracking. Those special status species occurring within the analysis area are listed in Table A7-1. None of the special status species listed in Table A7-1 are known to depend upon POC for habitat. Known sites for these species will continue to be managed as necessary to preclude the need to list them under the ESA for all alternatives.

For Bureau Sensitive or Bureau Assessment Species, the BLM requires review and assessment of potential effects, both beneficial and adverse, upon habitat considerations of each respective species. One or more of the following techniques may be used (BLM Instruction Memorandum No. OR-2003-054):

- Evaluation of species-habitat and presence of suitable or potential habitat;
- application of conservation strategies, plans, and other formalized conservation mechanisms;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources;
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale; and/or
- complete pre-projects survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

Subsequently, the BLM requires conservation of Bureau Sensitive or Bureau Assessment species that are affected by their management actions. Options for conservation include but

Table A7-1.—*BLM special status [1] and FS sensitive [2] animal species that are documented or suspected to occur within the Coos Bay, Medford, and Roseburg BLM Districts and the Siskiyou National Forest* [1]

Common name	Scientific name	Common name	Scientific name
American peregrine falcon	*Falco peregrinus anatum*	Brazilian free-tailed bat	*Tadarida brasiliensis*
Arctic peregrine falcon	*F. p. tundrius*	Columbian white-tailed deer [3]	*Odocoileus virginianus leucurus*
Bald eagle [3]	*Haliaeetus leucocephalus*	Fisher	*Martes pennanti*
Black-backed woodpecker	*Picoides articus*	Fringed myotis	*Myotis thysanodes*
Black-throated sparrow	*Amphispiza bilineata*	Townsend's big-eared bat	*Corynorhinus townsendii*
Common nighthawk	*Chordeiles minor*	Pacific pallid bat	*Antrozous pallidus pacificus*
Ferruginous hawk	*Buteo regalis*	Pacific shrew	*Sorex p. pacificus*
Lewis' woodpecker	*Melanerpes lewis*	California wolverine	*Gulo gulo*
Marbled murrelet [3]	*Brachyramphus m. marmoratus*		
Northern goshawk	*Accipiter gentilis*	Montane peaclam	*Pisidium ultramontanum*
Northern spotted owl [3]	*Strix occidentalis caurina*	Vernal pool fairy shrimp [3]	*Branchinecta lynchi*
Northern waterthrush	*Siurus noveboracensis*	Newcomb's littorine snail	*Algamorda subrotundata*
Oregon vesper sparrow	*Pooecetes gramineus affinis*	Fall Creek pebblesnail	*Fluminicola* sp. nov.
Purple martin	*Progne subis*	Keene Creek pebblesnail	*Fluminicola* sp. nov.
Streaked horned lark	*Eremophila alpestris strigata*	Toothed pebble snail	*Fluminicola* sp. nov.
Three-toed woodpecker	*Picoides tridactylus*	Klamath Rim pebblesnail	*Fluminicola* sp. nov. 1
Tricolored blackbird	*Agelaius tricolor*	Nerite pebblesnail	*Fluminicola* sp. nov. 11
White-headed woodpecker	*Picoides albolarvatus*	Diminutive pebblesnail	*Fluminicola* sp. nov. 3
White-tailed kite	*Elanus leucurus*	Oregon shoulderband	*Helminthoglypta hertleini*
Yellow-billed cuckoo	*Coccyzus americanus*	Sisters hesperian	*Hochbergellus hirsutus*
		Scale lanx	*Lanx klamathensis*
Black salamander	*Aneides flavipunctatus*	Rotund lanx	*Lanx subrotundata*
California slender salamander	*Batrachoseps attenuatus*	Green sideband	*Monadenia fidelis beryllica*
Cascades frog	*Rana cascadae*	Travelling sideband	*Monadenia fidelis celeuthia*
Del Norte salamander	*Plethodon elongates*	Crater Lake tightcoil	*Pristiloma articum crateris*
Southern Torrent Salamander	*Rhyacotriton variegatus*		
		Insular blue butterfly	*Plebejus saepiolus insulanus*
Foothill yellow-legged frog	*Rana boylii*	Mardon skipper butterfly [3]	*Polites mardon*
Northern red-legged frog	*Rana a. aurora*		
Siskiyou Mountains salamander	*Plethodon stormi*		
Tailed frog	*Ascaphus truei*		
Common kingsnake	*Lampropeltis getulus*		
Northwestern pond turtle	*Clemmy m. marmorata*		

[1] As defined in the Bureau's Special Status Species Policy [6840 Manual; data sort of the BLM Oregon State Office's database [04 April 2003].
[2] As defined in Forest Service Manual 2670; personnel communications from Lee Webb, Forest Biologist, Siskiyou National Forest [04 April 2003].
[3] These species are protected under the "Endangered Species Act" [1973, as amended].

are not limited to:

a. Modifying a project (such as timing, placement, intensity or dropping);
b. using buffers to protect sites; and/or
c. implementing habitat restoration actions (i.e., actions to benefit a species).

For Bureau Tracking species, species-oriented inventories, environmental analysis, monitoring, protection, mitigation, management, and Fish and Wildlife Service technical assistance are optional.

For State Listed species, species-oriented inventories, protection, mitigation, management, and Fish and Wildlife Service technical assistance are optional (BLM Instruction Memorandum No. OR-91-57).

The BLM conducts pre-project clearances surveys for many special status species. Where surveys are done, they have a reasonable probability of locating individuals and populations of these species. Because surveys for special status species discover them and the agency will subsequently protect them as needed, there are no differences between the alternatives. Special status species are not expected to be influenced by any of the alternatives.

Forest Service Sensitive Species

Forest Service policy is to not contribute to the need to list Forest Service Sensitive species under the provisions of the ESA and to conduct habitat examinations when proposed resource activities or uses would potentially make influential changes to elements of their habitat. Such examinations are usually required for Forest Service Sensitive species unless the habitat is assumed occupied or prior surveys of the area are adequate. Pre-disturbance surveys can have several objectives including:

- Assessing potential sensitive species habitat;
- searching suitable habitat for sensitive species occurrence;
- confirming known habitat is suitable; and
- refining knowledge of how habitat exists on the landscape and how species use their habitat. This could include travel corridors, relationships between cover and forage areas, human disturbances, and fragile habitat situations.

The Forest Service Sensitive species program includes species for which there is a documented concern for viability within one or more administrative units within the species' historic range (FSM 2670.22, WO Amendment 2600-95-7). The designation of sensitive carries a requirement to analyze the impacts of projects and, frequently to conduct surveys (FSM 2670). Forest Service Sensitive species in the analysis area are listed in Table A7-1.

None of the Forest Service Sensitive species listed in Table A7-1 are dependent upon POC for habitat. Under all of the alternatives, known sites for these species will continue to be managed as necessary to preclude the need to list them under the ESA.

The Forest Service conducts pre-project clearances for many Forest Service Sensitive species. Where surveys are conducted, there is a reasonable probability of locating individuals and populations of these species. Because surveys for Forest Service Sensitive species will

discover them and the agency will protect them as needed, there are no differences between the alternatives. Forest Service Sensitive wildlife species are not expected to be influenced by any of the alternatives.

References

Chappell, C.B.; Crawford, R.C.; Barrett, C.; [and others]. 2002. Wildlife Habitats: Descriptions, Status, Trends, and System Dynamics. *In:* Johnson, D.H.; O'Neal, T.A. 2002. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis.

Dillingham, C. 2003. Ecologist, Vegetation Management Solutions, USDA-FS Enterprise Team.

Johnson, D.H.; O'Neal, T.A., *eds.* 2002. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis. p 736.

Miller, R.C. 2003. Wildlife Technician, Illinois Valley Ranger District, Siskiyou NF.

USDA-FS; USDI-BLM. 1994. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-successional and Old-growth Related Species Within the Range of the Northern Spotted Owl. Portland, OR. 322 p.

USDA-FS; USDI-BLM. 2000. Final Supplemental Environmental Impact Statement for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. Regional Ecosystem Office, Portland, OR.

USDA-FS; USDI-BLM. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. Portland, OR. p. 130+.

USDA-FS; USDI-BLM. 2003. Survey and Manage Species Summary of Recommendations Regarding Category Placement and Range Changes from the 2002 Annual Species Review.

USDI-BLM. 1996a [updated 2002]. Western Oregon Districts Transportation Management Plan. Oregon/Washington State Office, Portland, OR. 36 p.

Webb, L.O. 2003. Forest Wildlife Biologist, Rogue River and Siskiyou NFs, Grants Pass, OR.

Botany

This section discusses the expected effects to Federal endangered, threatened, proposed, and candidate plant species, where applicable, under the Endangered Species Act (ESA) of 1973, as amended, by the alternatives. This section also discusses the expected influential changes, if any, to habitat of BLM Bureau Sensitive and Bureau Assessment species and to Forest Service Sensitive species by each alternative.

The BLM requires the effects of a proposed action be assessed on Bureau Sensitive and Bureau Assessment species (BLM Instruction Memorandum No. OR-2003-054).

The Forest Service Sensitive Species program includes species for which there is a documented concern for viability within one or more administrative units within the species' historic range (FSM 2670.22, WO Amendment 2600-95-7). Proposed projects that may impact Forest Service Sensitive species must be analyzed and to develop conservation strategies where applicable (FSM 2670). This analysis satisfies the Forest Service biological evaluation requirement (FSM 2672.4).

Discussion of Alternatives

Alternative 1. This alternative is the current management direction for BLM districts and the Siskiyou NF. It seeks to reduce or prevent introduction of the pathogen into disease-free areas by closing roads into these areas during the wet season to prevent the spores being carried from infested to uninfested areas, analyzing the risk of introduction to disease-free areas, developing mitigation measures at the project level, and informing the public about the reasons for these measure*s.*

Across the range of POC, areas with the highest presence of rare plants are primarily free of infestation, with the conspicuous exceptions of Whiskey Creek, narrow bands on the lower portions of Josephine Creek, and on the Middle Illinois River. Seasonal road closures and vehicle washing, mitigations for this alternative, prevent the introduction of noxious weeds and restrict unauthorized off-highway vehicles, thereby indirectly benefiting rare plants.

Alternative 2. This alternative is similar to Alternative 1, except that a risk key has been added for clarification of the environmental conditions that would trigger additional control or mitigation measures. Implementation of disease mitigating practices is expected to be more consistent because of the key.

The effects of Alternative 2 are similar to Alternative 1, in that implementation would reduce the rate of spread of the disease. Continued development of resistant POC stock would be available for timely replacement into important botanical habitats. Alternative 2 would assist in maintaining the long-term presence of POC in unique plant communities, which appear to be more abundant in high-risk areas.

Alternative 3. To the management actions of Alternative 2, Alternative 3 adds additional protection measures to 32 uninfested 6th field watersheds with at least 100 acres occupied by POC. It divides these watersheds into POC cores and buffers and applies additional standards and guidelines to each to lessen introduction of infestation into those areas.

The effects of Alternative 3 are the same as Alternative 2, with the exception of effects within the 32 uninfested watersheds. In these watersheds, the prohibition of harvest and discretionary use in POC cores would ensure a lasting presence of POC in unique plant communities, which appear to be more abundant in high-risk areas. Closing roads and lessening unauthorized off-highway vehicles may benefit rare plant communities throughout the watersheds by preventing disturbances such as noxious weed introductions throughout the watersheds.

Alternative 4. This alternative would remove all preventive measures that are in place and will speed up the resistance breeding program to more quickly replace POC killed by the disease with resistant seedlings.

The effects of Alternatives 4 and 5 are similar, differing in the mid- and long-term where Alternative 4 would impede advancement of the disease by increasing the introduction of resistant stock.

Alternative 5. This alternative would remove all preventative measures and discontinue the development of the resistant breeding program. Existing resistant seed orchard trees would continued to be used to reforest areas of mortality in breeding for which resistant stock is already developed.

The effects of Alternatives 4 and 5 are similar, differing in the mid- and long-term where Alternative 5 depends upon the natural, low-level disease resistance and range-wide distribution for the continued existence of POC.

Alternatives 4 and 5 would substantially increase advancement of the disease compared to the current direction. The effect of this high POC mortality on rare plants is unpredictable**.** POC is a large component of riparian habitats in areas where it is the largest tree species present. Loss of shade and stream bank stability that may result from the loss of POC could influence sensitive and rare plant communities adapted to stream microsites.

Threatened and Endangered Species

The BLM and the Forest Service survey for listed and proposed for listing plant species in and adjacent to proposed project areas. These surveys are designed to have a high likelihood of locating populations of these plant species. Because surveys for listed or proposed plant species will discover and subsequently protect these species with mitigation measures, there would be no difference between the five alternatives. Hence, these alternatives would have "no effect" to the endangered or threatened plant species listed in Table A7-2.

All projects proposed on BLM- or FS-administered land must meet the Aquatic Conservation Strategy objectives of the Northwest Forest Plan. As proposed projects are designed and analyze for effects to listed plants, needs of the plant species and habitat elements required to meet Aquatic Conservation Strategy objectives will be identified.

BLM Bureau Sensitive or Bureau Assessment Species

The BLM special status species policy is applied to actions requiring authorization or approval by the Bureau to insure they are consistent with conservation needs of special status species, which include Bureau Sensitive and Bureau Assessment species, and do not contrib-

Table A7-2.—*Threatened (T) or endangered (E) vascular plants within the range of Port-Orford-cedar* [1]

Common Name	Scientific name	BLM	FS
MacDonald's rockcress	*Arabis macdonaldiana* [2]	E	E
Applegate's milkvetch	*Astragalus applegatei*	E	E
Water howellia	*Howellia aquatilis*	T	T
Western lily	*Lilium ocidentale* [2]	E	E
Bradshaw's lomatium	*Lomatium bradshawii*	E	E
Agate desert-parsley	*Lomatium cookii* [2]	E	E
Kincaid's lupine	*Lupinus sulphereus* var. *kincaidii*	T	T
Kneeland Prairie penny-cress	*Thlaspi californicum* [*montanum* var. *californicum*]		E

[1] Species listed as threatened or endangered under the "Endangered Species Act" [1973, as amended]. The lists of species were provided by the various field offices of the USFWS which have jurisdiction over the range of POC area. Websites maintained by the agency were checked to track current changes to listed proposed, threatened, and endangered species, and proposed and designated critical habitat.
[2] Species that occur in close proximity to POC.

ute to the need to list them under the provisions of the ESA.

For Bureau Sensitive or Bureau Assessment species, the BLM requires review and assessment of potential effects, both beneficial and adverse, upon habitat considerations of each respective species. One or more of the following techniques may be used (BLM Instruction Memorandum No. OR-2003-054):

- Evaluation of species-habitat and presence of suitable or potential habitat;
- application of conservation strategies, plans, and other formalized conservation mechanisms;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources;
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale; and/or
- complete pre-projects survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

Subsequently, the BLM requires conservation of Bureau Sensitive or Bureau Assessment species that are affected by their management actions. Options for conservation include but are not limited to:

a. Modifying a project (such as timing, placement, intensity or dropping);
b. using buffers to protect sites; and/or
c. implementing habitat restoration actions (i.e., actions to benefit a species).

The BLM conducts pre-project clearances surveys for many special status species. Where surveys are done, they have a reasonable probability of locating individuals and populations of these species. Because surveys for special status species will discover them and the agency will subsequently protect them as needed, there are no differences between the alternatives. Bureau Sensitive and Bureau Assessment species listed in Table A7-3 are not expected to be influenced by any of the alternatives.

Forest Service Sensitive Species

Forest Service policy is to not contribute to the need to list Forest Service Sensitive species under the provisions of the ESA and to conduct habitat examinations when proposed resource activities or uses would potentially make influential changes to elements of their habitat. Such examinations are usually required for Forest Service Sensitive species unless the habitat is assumed occupied or prior surveys of the area are adequate. Pre-disturbance surveys can have several objectives including:

- Assessing potential sensitive species habitat;
- searching suitable habitat for sensitive species occurrence;
- confirming known habitat is suitable; and
- refining knowledge of how habitat exists on the landscape and how species use their habitat. This could include travel corridors, relationships between cover and forage areas, human disturbances, and fragile habitat situations.

Within the range of POC, Table A7-3 lists Forest Service Sensitive species in Regions 5 (California) and 6 (Oregon). The Forest Service Sensitive species program includes species for which there is a documented concern for viability within one or more administrative units

Table A7-3.—*Vascular plants listed as BLM Bureau sensitive/assessment and Forest Service sensitive documented or suspected within close proximity of Port-Orford-cedar*

Common name	Scientific name	BLM [1]	FS [2]
Siskiyou sedge	*Carex gigas*	BA	R6
Siskiyou Indian paintbrush	*Castilleja miniata* ssp. *elata*		R5
Clustered lady's slipper	*Cypripedium fasciculatum*	BS	R5/R6
Oregon willow-herb	*Epilobium oreganum*	BS	R5/R6
Siskiyou daisy	*Erigeron cervinus*	BA	R5/R6
Scott Mountain fawn lily	*Erythronium citrinum* var. *roderickii*		R5
Henderson's fawn lily	*Erythronium hendersonii*		R5
Waldo gentian	*Gentiana setigera*	BS	R6
Purple rush-lily	*Hastingsia bracteosa* var. *atropurpurea*	BS	R6
Large-flowered rush-lily	*Hastingsia bracteosa* var. *bracteosa*	BS	R6
Dudley's rush	*Juncus dudleyi*		R5
Parnasia	*Parnasia palustris*		R5
Del Norte butterwort	*Pingicula vulgaris* ssp. *macroseras*		R5
California sworfern	*Polystichum californicum*	BA	R6
Crested polentilla	*Potentilla cristae*		R5
Showy raillardella	*Raillardella pringlei*		R5
Del Norte willow	*Salix delnortensis*	BA	R6
Great burnet	*Sanguisorba officinalis*		R5
English Peak greenbriar	*Smilax jamesii*		R5/R6
Western bog violet	*Viola primulifolia* var. *occidentalis*	BS	R5/R6

[1] BS = Bureau sensitive; BA = Bureau assessment.
[2] Forest Service Regions: R5 = California; R6 = Oregon.

within the species' historic range (FSM 2670.22, WO Amendment 2600-95-7). The designation of sensitive carries a requirement to analyze the impacts of projects and, frequently, to conduct surveys (FSM 2670).

The Forest Service conducts pre-project clearances for many Forest Service Sensitive species. Where surveys are conducted, there is a reasonable probability of locating individuals and populations of these species. Because surveys for Forest Service Sensitive species will discover them and the agency will protect them as needed, there are no differences between the alternatives. Forest Service Sensitive species listed in Table A7-3 are not expected to be influenced by any of the alternatives.

Contributors

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References

Kagan, J. 1990a. Draft Species Management Guide for *Epilobium oreganum* Greene. [Developed for] the Siskiyou NF and Medford BLM District, [on file at] Six Rivers NF Supervisor's Office, Eureka, CA.

Kagan, J. 1990b. Draft Species Management Guide for *Gentiana setigera* Wats. [Developed for] the Siskiyou NF and Medford BLM District, [on file at] Six Rivers NF Supervisor's Office, Eureka, CA.

Kagan, J. 1996. Draft Conservation Agreement for *Hastingsia bracteosa*, *H. atropurpurea*, *Gentiana setigera*, *Epilobium oreganum*, and *Viola primulifolia* var. *occidentalis* and Serpentine Darlingtonia Fens and Wetlands from Southwestern Oregon and Northwestern California. [On file at] Six Rivers NF Supervisor's Office, Eureka, CA.

Skinner, M.W.; Pavlik, M.; *eds.* 1994. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. Sacramento, CA.

USDA-FS. 2001. Sensitive Species Plant List, Region 6, U.S. Forest Service. [On file at] Siskiyou NF Supervisor's Office, Grants Pass, OR.

USDA-FS. 2001. Sensitive Species Plant List, Region 5, U.S. Forest Service. [On file at] Six Rivers NF Supervisor's Office, Eureka, CA.

Hickman, J.C. 1993. The Jepson Manual of Higher Plants of California. University of California Press, Berkeley. 1,400 p.

Oregon Natural Heritage Program. 1997. Oregon Natural Heritage Program Data Base, Portland, OR.

USDA-FS. 1989. Siskiyou National Forest Land and Resource Management Plan. Siskiyou National Forest, Grants Pass, OR.

USDA-FS. 1999. Forest Service Manual: Wildlife, Fish, and Sensitive Plant Management (Section 2670), WO Amendment 2600-91-3 [effective 5/17/99].

USDA-FS. 1997. Sensitive and Endemic Plant Records and Plant Survey Records (1978–1997). [On file at] Siskiyou National Forest Supervisor's Office, Grants Pass, OR.

USDA-FS; USDI-BLM. 1994a. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-successional and Old-growth Related Species Within the Range of the Northern Spotted Owl. Portland, OR. 322 p.

USDA-FS; USDI-BLM. 1994b. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Portland, OR.

USDA-FS; USDI-BLM. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. Portland, OR. p. 130+.

Vorobik, L. 2002. Research Botanist, [personal communication (written report) regarding identification of *Arabis macdonaldiana* specimens].

Appendix 8: Areas of Critical Environmental Concern and Research Natural Areas and Requirements for Designation

Areas of Critical Environmental Concern

This appendix explains ACEC criteria as described in 3 CFR 16 and describes the existing and proposed ACECs and their relevant and important values (Tables A8-1 and A8-2). BLM regulations (43 CFR part 1610) define an ACEC as an area

> . . . within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.

ACECs differ from other special management designations such as wilderness study areas in that the designation, by itself, does not automatically prohibit or restrict other uses in the area. The one exception is that a mining plan of operation is required for any proposed

Table A8-1.—*Areas of critical environmental concern and research natural areas within the range of Port-Orford-cedar in Oregon*

	POC/ PL	Acres	Primary objectives	Off-highway vehicle designation	Leasable mineral entry	Locatable/ salable mineral entry	Timber harvest
Coos Bay BLM							
Cherry Creek RNA/ACEC		570	Western hemlock/oxalis; western hemlock/rhododendron--Oregon grape	Closed	Open/NSO	Closed	Not available
New River ACEC	PL	880	Dune blocked lake with aquatic beds, marshy shore, surrounded by unconsolidated sands	Closed/ limited	Open/NSO	Closed	Not available
North Spit ACEC		580		Limited	Open/NSO	Closed	Not available
China Wall ACEC		240		Closed	Open/NSO	Closed	Not available
Upper Rock Creek ACEC	POC	460		Limited	Open/NSO	Closed	Not available
North Fork Hunter Creek ACEC	POC	1,730	Coastal oak-conifer woodland and meadow mosaic	Limited	Open/NSO	Closed	Not available
Hunter Creek Bog ACEC	PL	570	Knobcone pine forest; *Darlingtonia* fen on serpentine peridotite w/POC	Limited	Open/NSO	Closed	Not available

Table A8-2.—*Areas of critical environmental concern and research natural areas within the range of Port-Orford-cedar in Oregon*

Area Name	POC/ PL	Acres	Primary objectives	Management
Medford BLM				
Eight Dollar Mountain ACEC		1,247	Special status plants and *Darlingtonia* wetlands.	Closed for timber harvest. Off-highway vehicle [OHV] use restricted to existing roads. Mineral leasing subject to no surface occupance [NSO]. Open to mineral entry. Acquisition needed.
Brewer Spruce ACEC/RNA	POC	390	Brewer spruce forest and aquatic cell for mid- to high-elevation permanent pond.	Not available for timber harvest. OHV use restricted to designated roads. Mineral leasing subject to NSO. Close to mineral entry.
Woodcock Bog ACEC/RNA	PL	280	*Darlingtonia* wetland on serpentine and special status plant species.	Not available for timber harvest. Closed to OHV use. Mineral leasing subject to NSO. Closed to mineral entry.
Bobby Creek ACEC/RNA	POC	428	Natural systems, botanical, special status species, and wildlife fisheries.	Not available for timber harvest. OHV use restricted to existing roads. Mineral leasing subject to NSO. 428 acres designated as ACEC and 1,702 acres designated as RNA.
Crooks Creek ACEC/RNA		149	Natural systems, wildlife, and special status species.	Not available for timber harvest. OHV use restricted to existing roads. Mineral leasing subject to NSO.
French Flat ACEC/RNA		656	Special status plants and plant communities.	Not available for timber harvest. OHV use restricted to existing roads. Mineral leasing subject to NSO. Closed to OHV.
Iron Creek ACEC/RNA		286	Natural systems, wildlife and botanical values.	Not available for timber harvest. OHV use restricted to existing roads. Mineral leasing subject to NSO.
Poverty Flat ACEC/RNA		29	Natural systems, vernal pool wetlands, and special status plants.	OHV use restricted to existing roads. Mineral leasing subject to NSO.
Rough and Ready ACEC/RNA	POC	1,164	Natural systems, special status plants, botanical.	Not available for timber harvest. OHV use limited to designated roads. Mineral leasing subject to NSO.
Bobby Creek ACEC/RNA	POC	1,702	Natural systems, botanical, special status species, and wildlife fisheries; moist tanoak forests [tanoak/Port-Orford-cedar/salal].	Not available for timber harvest. OHV use restricted to existing roads. Mineral leasing subject to NSO. 428 acres designated as ACEC and 1,702 acres designated as RNA.
Brewer Spruce Enlargement ACEC/RNA	POC	1,384	Natural area of Brewer spruce forest for scientific research and baseline study area.	Not available for timber harvest. Closed to OHV use. Mineral leasing subject to NSO. Closed to mineral entry.
Grayback Glade ACEC/RNA	POC	1,069	Terrestrial white-fir-Port-orford-cedar and aquatic first order stream for scientific research and baseline study area.	Not available for timber harvest. Closed to OHV use. Mineral leasing subject to NSO. Closed to mineral entry.
North Fork Silver Creek ACEC/RNA	POC	499	Douglas-fir/white fir forest with diverse shrub understory and third order stream; for scientific research and baseline study area.	Not available for timber harvest. Closed to OHV use. Mineral leasing subject to NSO. Closed to mineral entry. No surface disturbance within 100 feet of boundary.

Area Name	POC/ PL	Acres	Primary objectives	Management
Pipe Fork ACEC/RNA	POC	529	Port-orford-cedar/Oregon grape and Port-orford-cedar/salal communities; for scientific research and baseline study area.	Not available for timber harvest. Closed to OHV use. Mineral leasing subject to NSO. Closed to mineral entry.
Roseburg BLM				
Beatty Creek	POC	180	Jeffrey Pine on Serpentine	ACEC/RNA
Bushnell-Irwin Rocks		958	Oak-Madrone-Conifer Woodland & 1st to 3rd Order Stream System	ACEC/RNA
Siskiyou National Forest				
Cedar Log Flat	POC	421	Port-Orford-cedar/hairy honeysuckle/fescue on ultramafic soils. Jeffrey pine grassland savannah	RNA
Coquille River Falls	PL	470	Douglas-fir, Western hemlock, Port-Orford-cedar forest with wet shrubs and forbs.	RNA
Lemmingsworth Gulch	POC	1,224	Port-Orford-cedar/hairy honeysuckle/fescue on ultramafic soils.	RNA
Port-Orford-Cedar	PL	1,122	Douglas-fir, Western hemlock, Port-Orford-cedar forest with wet shrubs and forbs. Low elevation pond with aquatic beds and marshy shore. Oregon ash, red alder swamp	RNA
Siuslaw National Forest				
Tenmile	POC	1,190	Sitka spruce-Port-Orford-cedar on sand	RNA

mining activity within an ACEC. The ACEC designation is an administrative designation and is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation. The intent of Congress in mandating the designation of ACECs through the "Federal Land and Policy Management Act" was to give priority to the designation and protection of areas containing truly unique and significant resource values.

Research Natural Areas

According to Oregon Natural Heritage Program (ONHP) (ONHP 1993, 1998) the purpose for research natural areas (RNAs) are:

> . . . to preserve examples of all significant natural ecosystems for comparison with those influenced by man; to provide educational and research areas for ecological and environmental studies; and to preserve gene pools of typical and endangered plants and animals.

All BLM RNAs are designated and managed as ACECs (Oregon Manual Supplement 1623.35 for RNAs only). Therefore, all RNAs must meet both the ACEC criteria, as applied

in writing by an interdisciplinary team and approved by the field manager, as well as the need for a RNA cell as defined in the ONHP data base. The ACEC can be larger than the RNA, to encompass other values, which may not be needed for the RNA. RNA management plans are usually more restrictive than ACEC plans. RNA cells determined by the ONHP are the basic units that are represented in a natural area system. These cells can be an ecosystem, community, habitat, or organism. Cells are artificial constructs used by the ONHP to inventory, classify, and evaluate natural areas in Oregon. Cells contain one or more ecosystem elements. Typically, a RNA aggregates several cells that need representation. The ONHP was created by the Oregon Natural Heritage Advisory Council to the State Land Board in 1993. They are the State counterpart of the Federal program. Of the 16 existing and proposed ACECs, 13 have ONHP cells within their areas. Within the existing and proposed ACECs, 11 have existing or proposed RNAs.

Requirements for Designation

To be designated as an ACEC, an area must meet the relevance and importance criteria listed in BLM 1613 Manual (BLM 1988) and require special management. Specific evaluation questions for each of these three elements are listed below.

Relevance Criteria

Does the area contain one or more of the following:

- A significant historic, cultural, or scenic value;
- a fish and wildlife resource;
- a natural process or system; or
- a natural hazard?

Importance Criteria

Does the value, resource, system, process, or hazard described above have substantial significance or value? Does it meet one or more of the following criteria?

- Is it more than locally significant, especially compared to similar resources, systems, processes, or hazards within the region or Nation;

- does it have qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change;

- has it been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of the "Federal Land and Policy Management Act;"

- does it have qualities that warrant highlighting to satisfy public or management concerns about safety and public welfare; or

- does it pose a significant threat to human life and safety or property?

Need for Special Management

Does the value, resource, system, process, or hazard require special management to protect (or appropriately manage) the relevant/important value(s)? Special management is defined as or is needed when:

1) Current management activities are not sufficient to protect a given relevant/important resource value and a change in management is needed that is not consistent with the existing land use plan(s).

2) The needed management action is considered unusual or outside of the normal range of management practices typically used.

3) The change in management is difficult to implement without ACEC designation.

Evaluation Process

Regardless of who nominates an area as a potential ACEC, it is the BLM who is responsible for evaluating the area to determine if it meets the relevance/importance criteria and requires special management.

Appendix 9: Summary of Modeled Potential Stream Temperature Increases Resulting from Port-Orford-Cedar Mortality

To help identify sideboards to the affect of POC mortality on stream temperatures, the following scenarios were run on the stream SHADOW model, Version X-15 (Parks 1993). Mortality of POC is expected to have the largest affect on stream temperature on ultramafic soils, where (1) overall vegetation is less than on other soil types, (2) POC is more prominent along stream sides compared to other species, and (3) POC is less likely to be replaced by other species if it is lost. The model was run for 10 (cases 1, 2, and 3) and 40 (cases 4, 5, and 6) square mile drainages. Latitude is 43 degrees, solar declination is 17 degrees (August 1), and ground temperature is 53 degrees. Modeling parameters are shown in Table A9-1.

These parameters assume 100 percent POC within the first 15 feet from the stream channel for a mile (POC averages 50 percent of the overstory canopy in the 33,000 acres of riparian ultramafic plant associations in which it is prominent [Table 3&4-12]), and 100 percent kill for the 15 feet on either side of the channel, and zero kill beyond that distance. Results of conduction, convection, inflow, etc., were not modeled. The results of the temperature modeling are shown in Table A9-2.

Table A9-1.—*Modeling parameters for SHADOW stream temperature effects*

	Uninfested		Infested	
	Drainage size [square miles]		Drainage size [square miles]	
Modeling Element	10	40	10	40
% tree overhang	15	15	0	0
Flow width [feet]	8	17	8	8
Active channel width [feet]	30	60	30	30
Modeled length [9 miles]	1	1	1	1
Low flow [August 1] [cu.ft./sec.]	2.2	8.8	2.2	2.2
Tree height [relatively low on ultramafic] [feet]	130	130	130	130
Slope of adjacent terrain [%]	20	10	20	20
Distance from channel edge to trees [feet]	2	2	15	15
Shade density of unaffected [adjacent] stand [%]	70	55	70	70

Table A9-2.—*Summary of predicted shade decrease and temperature increase for August 1, comparison of uninfested and infested riparian areas with 100 percent POC*

	Uninfested Port-Orford-cedar		Infested Port-Orford-cedar		Comparison	
Case [1]	% shade	Temperature [C] increase/mile	% shade	Temperature [C] increase/mile	% shade decrease/mile	Temperature [C] increase/mile
1	86	1.6	77	2.7	9	1.1
2	88	1.4	77	2.7	11	1.3
3	88	1.4	74	3.0	12	1.6
4	70	1.8	61	2.3	9	0.5
5	69	1.9	58	2.6	11	0.7
6	49	3.0	30	4.2	19	1.2

[1] Case 1 and 4 are north-south orientation [0 degrees N]; case 3 ands 6 are east-west orientation [90 degrees N]; and case 2 and 5 are intermediate [45 degrees N].